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PHYSICIAN IN CHARGE OF THE SKIN DEPARTMENT, GUY'S HOSPITAL.

LECTURE II.*

I PROPOSE in this lecture to discuss the significance and nature of a group of eruptions provoked by micro-organisms or toxins, which reach the skin via the blood stream. For the sake of clarity, I would suggest for this group the generic name of the *exanthematides*. This term indicates a relationship with the exanthemata of the specific fevers, which is undoubted, and at the same time possesses the termination "ide," which has been commonly accepted for some of the eruptions under consideration—e.g., the tuberculides, syphilides, trichophytides, and leprides.

If, after excluding the specific fevers, one surveys the list of general infective diseases associated with cutaneous manifestations, two are outstanding by reason of their ubiquity, their serious nature, their chronicity, and the amount of accurate knowledge that has accumulated concerning them; these two diseases are tuberculosis and syphilis. They have dominated medical thought and research for generations; they still dominate dermatological thought and research throughout the greater part of the world.

Less obviously of interest to dermatologists is another group of diseases, which the general physician has labelled "rheumatic." But if tuberculosis and syphilis belong in great part to the domain of dermatology, the rheumatic diseases, especially, perhaps, rheumatic fever, also have cutaneous manifestations, which are not only of interest to physicians and dermatologists alike, but are in my opinion so closely akin in their mechanism of production and significance to certain tuberculous and syphilitic eruptions, that they enable us to draw deductions of the highest importance.

Since Poynton and Paine[1] in 1900 presented their thesis that rheumatic fever is due to streptococcal infection, evidence has gradually accumulated that both this condition, as well as certain other forms of rheumatic disease, are of streptococcal origin. Although I have reviewed a great deal of the experimental work that has been carried out in recent years on the pathogenesis of rheumatic fever, I am obviously not fitted to express an authoritative opinion on the streptococcal theory of its causation. Whether, however, one accepts the specificity of the particular strain or strains of streptococcus, isolated by Small[2], by Birkhaug,[3] and by Lazarus-Barlow,[4] or whether with Swift[5] and his co-workers one believes, as seems more probable, that the pathogenesis of the disease depends on the existence in certain persons of a condition of allergy to various strains of streptococci, resulting from repeated low-grade infections or the existence of chronic foci of infection, the evidence that like tuberculosis and syphilis, rheumatic fever is allergic in nature, and that the streptococcal group of organisms is responsible seems to me overwhelming. This evidence is based on clinical, pathological, bacteriological, and experimental findings, and I have yet to hear any argument to the contrary that will bear examination.

Swift[6] in America, and Bezançon and Weil[7] in France, have drawn striking comparisons between the various manifestations of rheumatic fever with those of tuberculosis and syphilis.

* Lecture I. appeared in THE LANCET of August 24th.

To quote Swift, Derick, and Hitchcock:—

"In all three diseases there is usually an initial lesion, which, when present, is followed shortly by distinct enlargement of the satellite lymph nodes. In all, the serious manifestations occur at a distance from this lesion, and usually are multiple in distribution. In tuberculosis, although the majority of the population is infected, only relatively few persons ever show clinical symptoms. In both rheumatic fever and tuberculosis a rise in the standard of general living conditions has been accompanied by a decreasing incidence of the diseases. A number of workers have called attention to a similarity in the familial incidences of these two infections. In all three diseases there is a decided tendency to relapses, which seems to be due to a breakdown of a partial immunity. In all the histopathological pictures of the typical lesion is that of a granuloma, the histogenesis of which in tuberculosis and syphilis has been definitely proven to be allergic in nature. This allergic lesion can be considered an effort on the part of the body to restrict the activity of the micro-organism to these local areas. The tubercle has the same general characteristics throughout the life of the individual, although there may be special features of the tuberculous infection in certain tissues or organs. While the different syphilides may seem to have decidedly different characteristics, these variations may be considered quantitative rather than qualitative. In both tuberculosis and rheumatic fever the presence of lesions in the walls of the serous cavities or joints is accompanied by the outpouring of serofibrinous exudate. In both rheumatic fever and syphilis there is a marked tendency to focal endo- and perivascular involvement; and both infections are prone to attack the heart. It is true that differences can be found in the three diseases; but it is in these differences that there reside the features which bring about the peculiar pictures of the respective maladies. Indeed, in individual cases it is sometimes difficult to decide whether one or another type of infection is active until specific differential diagnostic measures can be applied."

It is my general agreement with this thesis that has led me to sunbmit a comparison between certain cutaneous manifestations of tuberculosis and syphilis together with those of the severer forms of ringworm infection on the one hand, and of rheumatic or streptococcal infection on the other. All these eruptions may, I think, be conveniently classed together as the exanthematides.

A. THE SYPHILIDES.

In the average case of untreated syphilis there is:—

(1) A period of incubation, about three weeks in duration, between contamination and the appearance of the *primary lesion*.

(2) A primary period during which the spirochætes multiply locally, invade the lymphatics and glands, thence to reach the circulation, but the Wassermann reaction is negative; this is also about three weeks in duration.

(3) A second incubation period, again of about three weeks, between the first appearance of a positive Wassermann reaction and the development of the secondary eruptions—*the secondary syphilides*. With these the Wassermann reaction is at its height. The various forms of secondary syphilide become successively less extensive, but larger in size, and the Wassermann reaction also tends to diminish in intensity.

(4) With the subsidence of secondary manifestations, there may be a period of freedom from symptoms, and the Wassermann reaction may become latent or actually negative.

(5) Finally, there is the *tertiary* period, when the large nodular gummata represent the cutaneous manifestations, and the Wassermann reaction is found positive in from 60–80 per cent. of cases.

As in the specific fevers, there is thus an incubation period during which time a state of allergy towards the infecting virus is developing, and the secondary syphilides, corresponding to the exanthematous rashes, represent allergic reactions of the skin against the spirochætes reaching it via the blood stream, such reactions having for their object the destruction of the organisms in situ. This question will be discussed more in detail in connexion with the tuberculides and trichophytides.

B. THE TUBERCULIDES.

Although tuberculosis cannot so readily as syphilis be divided into primary, secondary, and tertiary

periods, nevertheless such a division can be made, and the cutaneous manifestations of the two diseases be very closely compared. In the vast majority of cases, infection with the tubercle bacillus takes place via the digestive tract—mouth, nasopharynx, or small intestine—thence reaching the lymphatic system. As Calmette[8] has clearly shown, the view, still widely held, of a primary "chancre of inoculation" in the lung ("lesion of Parrot and Kuss") is open to serious criticism. Very occasionally, however, a true primary tuberculous chancre of the skin may occur, comparable to the primary sore of syphilis, and to that evoked by the experimental inoculation of the skin in animals. Holt[9] has collected 41 cases, including one under his own observation, in which the primary chancre developed on the penis of infants after ritual circumcision by a phthisical rabbi, and of these 16 are known to have died. Milian and Brocq have recorded two examples on the lips, and Bruusgaard has studied seven cases. From the primary lesion the neighbouring lymphatics and glands are invaded, and the Pirquet reaction becomes positive in from 12 days to some weeks. Boeck[10] and Bruusgaard[11] have seen an eruption of lichen scrofulosorum, with a phlyctenular keratitis, develop six weeks after the healing of such a chancre on the finger (compare with a secondary syphilide).

In 1896, Darier[12] proposed the term "tuberculides" for a group of eruptions occurring in frequent association with evident manifestations of tuberculosis. Considerable discussion has naturally taken place, as to what are and what are not tuberculides. The list suggested by Darier himself in the last edition of his Précis, is as follows:—

(A) *Cutaneous Tuberculides.*—The situation of the lesions is dermo-epidermic in the following forms of tuberculide.
(1) *Lichenoid.*—Lichen scrofulosorum.
(2) *Papulo-necrotic.*—Folliclis; acnitis of Barthélemy.
(3) *Acneiform.*—Acne cachecticorum of Hebra (a simple variety of (2).
(4) *Lupoid.*—Benign sarcoid or lupoid of Boeck. Lupus pernio.
(5) *Erythemato-atrophic.*—Lupus erythematosus—fixed type.
(6) *Erythematous.*—Exanthematous lupus erythematosus: tuberculous form of erythema perstans.
(B) *Hypodermic Tuberculides.*—The situation is in the subcutaneous tissue. These are represented by the tuberculous form of erythema induratum (Bazin's disease), the subcutaneous sarcoids of Darier-Roussy, and the disseminated nodular sarcoids, all of which are probably merely varieties of the same type of lesion. Erythema nodosum probably should be included in some cases.

Of these every one is agreed as to the claims of lichen scrofulosorum, the papulo-necrotic varieties (folliclis, &c.), and at any rate the majority of cases of Bazin's erythema induratum. While most dermatologists consider that in some instances lupus erythematosus is of tuberculous origin, Schaumann[13] prefers to class it, not with the tuberculides, but, in association with lupus pernio, the sarcoids of Boeck, and the malignant lymphogranuloma of Sternberg, as a cutaneous manifestation of paratuberculosis, due to the filtrable form of the tubercle bacillus. In addition, erythema nodosum and erythema multiforme are considered by some to be toxi-tuberculides in certain cases.

Pathogenesis of the Tuberculides.

A great deal of very careful experimental work has been carried out in connexion with the pathogenesis of the tuberculides, and it has thrown much light on the phenomenon of allergy, and on the part played by the skin in the defence of the body as a whole. Briefly, the salient points may be summarised as follows:—

The clue to the nature of the tuberculides is provided by the phenomenon described by Koch[14] in 1891. As is well known, the subcutaneous inoculation of virulent tubercle bacilli into a susceptible animal like the guinea-pig is followed after 10–15 days by a nodule which ulcerates—the tuberculous chancre—comparable to the primary sore of syphilis, and identical with that occasionally met with in young children, not previously infected with tubercle, as already stated. This experimental chancre persists, and in it the bacilli multiply, invade the lymphatics and glands, and eventually produce a generalised visceral tuberculosis, affecting chiefly the liver and spleen, from which the animal dies. If the guinea-pig be reinoculated at another point in the skin before its death—preferably 4–6 weeks after the primary inoculation—with living or dead bacilli, an inflammatory hæmorrhagic lesion is rapidly formed, which breaks down, scabs over, and, unlike the primary chancre, heals, leaving a scar. In it the newly inoculated bacilli are destroyed, and there is no invasion of the adjacent lymphatic glands. This is the so-called Koch's phenomenon, and the lesion resulting from the second inoculation represents a defensive reaction against the superinfection (Calmette), and is comparable to certain forms of tuberculide as they occur in human beings. As Sequeira[15] puts it, the tuberculides are spontaneous examples of Koch's phenomenon.

Gougerot and Laroche,[16] Lewandowsky,[17] and others may be said to have produced tuberculides experimentally, the two first mentioned by rubbing the epilated skin of guinea-pigs, *previously tuberculised*, with emulsions of living and dead bacilli, Lewandowsky by inoculating bacilli directly into the left ventricle or veins. The lesions thus produced correspond clinically and histologically to human tuberculides—particularly of the papulo-necrotic type.

The explanation, then, of the tuberculides usually given is that in a person, already sensitised to tubercle—i.e., in a state of allergy, and with an active tuberculous focus, such as lymphatic glands—there occurs a bacteriæmia with dead or attenuated bacilli, and these, coming to rest in a small dermic or hypodermic vessel, provoke a local inflammatory tissue reaction of the tuberculoid type, which has for its object the destruction of the embolised bacillus, and is thus a protective mechanism. This would explain why bacilli are so seldom demonstrable in the lesions, and why animal inoculation with material from them so often fails; nevertheless, in recent lesions bacilli have been found, or successful inoculations have been made by several observers in lichen scrofulosorum, papulo-necrotic tuberculide, erythema induratum, lupus erythematosus, and in the lupoids of Boeck. Moreover the injections of tuberculin into a person with active tuberculosis may provoke an outbreak of tuberculides—e.g., lichen scrofulosorum, erythema induratum, and when such are already present, marked focal reactions occur.

It will be seen that in the mechanism of their production the tuberculides resemble the secondary and tertiary eruptions of syphilis, since they represent allergic reactions of the sensitised skin or subcutaneous tissue against tubercle bacilli circulating in the blood stream.

C. The Trichophytides.

In 1912, Jadassohn,[18] and later Guth,[19] Sutter,[20] Bloch,[21] Rasch,[22] Pulvermacher,[23] Jessner,[24] Ambrosoli,[25] Bruusgaard,[26] and others, described a variety of *generalised* eruptions that might occur as a result of a local infection of the skin with ringworm fungi, when such infection caused an inflammatory reaction of sufficient intensity. Following Darier's terminology, these eruptions are called trichophytides, microsporides, and favides, according to the type of ringworm fungus responsible. For the sake of convenience I shall include them all under the name of trichophytide. They are exactly comparable to the syphilides and tuberculides. As in the majority of cases of syphilis, there is a primary lesion in the skin, which develops at the site of inoculation of the fungus. As a result of this, the skin as a whole may become sensitised, so that, should dissemination of the fungus or of its toxin through the blood stream occur, the secondary eruptions—trichophytides—result from their contact with the sensitised skin. It is only, however, in the severer forms of suppurative ringworm—usually of animal origin—that these secondary eruptions are likely to be met with. I believe that Neisser and Plato[27] in 1902 were the first to prepare

an extract from ringworm fungi, which they named trichophytin, and which is analogous to tuberculin. They found that in cases of deep-seated ringworm—i.e., those in which there is a marked inflammatory reaction—the injection of this trichophytin provoked a general reaction with rise of temperature and constitutional symptoms, together with a local reaction at the site of injection and a focal response in the area of infection. Normal controls, patients with other diseases, and those suffering from the *superficial* forms of ringworm, gave no local or general reactions. Since then a good deal of experimental work has been carried out along similar lines. Briefly it may be said:—

(1) That a deep-seated ringworm in man, or an experimental infection with certain species of ringworm in animals, may produce an allergic state, so that general and focal reactions result from injection of trichophytin, and positive cutaneous or intracutaneous tests with this substance may be obtained, which persists for years after the infection is cured.

(2) In animals a lasting immunity to reinfection results. In man, a reinoculation produces a short-lived lesion, comparable to that arising from a second inoculation of tubercle bacilli in Koch's phenomenon. Clinically, a deep-seated ringworm produces a very considerable degree of immunity in the sense that second attacks are very rare; this is probably due to cutaneous allergy, which causes rapid destruction of the reinoculated fungus, rather than to true immunity.

(3) It has been shown by Bloch, first, that animal immunity to ringworm can only be produced by inoculating the skin, subcutaneous or intraperitoneal inoculations being ineffective; secondly, that in a sensitised person the sensitiveness is in the skin-cell itself, for by transplanting two pieces of skin, one from a sensitised and one from a non-sensitised person, on to a normal person, the piece from the sensitised person, after the graft had healed, gave a positive cutaneous reaction to trichophytin, whereas the other piece and the subject's own skin gave negative results.

(4) As a result of suppurative ringworm infection (most commonly in trichophytosis) there may occur generalised eruptions—the trichophytides, microsporides, and favides—accompanied sometimes by fever, enlargement of the lymphatic glands and spleen, swelling of the joints, and a polymorphonuclear leucocytosis. In some cases these eruptions are due to dissemination of the fungus spores through the blood stream, since the fungus has not only been successfully cultured from deep-seated nodular or papular trichophytides by several observers, but also from the circulating blood itself by Ambrosoli and by Jessner. In some cases, however, these general eruptions may result from exogenous spread from the primary site of infection by the lymphatics, for example, as in the corymbose forms; or from the action of trichophytin on the sensitised skin-cells, since Bloch produced first a scarlatiniform erythema and later a typical lichenoid trichophytide by injection of trichophytin in a boy who had had a severe ringworm infection, but was cured.

We thus see how very closely in their pathogenesis the syphilides, tuberculides, and trichophytides are related. These infections may result in a high degree of allergy, whereby the tissue-cells, particularly of the skin, become sensitised, so that when the dissemination through the blood stream of the infective organism, or, in some cases, of its toxin—e.g., tuberculin and trichophytin—takes place, a variety of eruptions—or cutireactions—occur, representing defensive reactions against superinfection, and resulting in the destruction of the organism or toxin in situ.

D. The Streptococcides.

Some years ago, at a combined discussion on focal infection in relationship to dermatology, I proposed the name "streptococcides" to designate certain eruptions that I believed to be allergic reactions to streptococcal infection, and comparable to the tuberculides, syphilides, and trichophytides, and I drew up a comparative list, showing how the same type of cutaneous or subcutaneous reaction might result from these four infections. Unfortunately, Sabouraud[28] has recently employed the same word in a different sense, to indicate certain *external* streptococcal infections of the skin, and this is to be deplored, since, in my opinion, the termination "-ide" should be reserved for allergic reactions to micro-organisms or toxins reaching the skin via the blood stream.

The majority of the eruptions that I have labelled streptococcides belong to the erythema group, and include some like erythema multiforme and erythema nodosum which have long been noted to occur in association with rheumatic fever, or, like lupus erythematosus, with chronic rheumatoid arthritis.

Now the dermatologists are in exactly the same position vis-à-vis the eruptions I term "streptococcides" as the physicians are with regard to rheumatic fever, and for the same reason. Tuberculosis, syphilis, and ringworm are well defined and established diseases, and a definite diagnosis of one or the other can usually be substantiated. But the streptococcal group of organisms, some strains of which are normal saprophytes that are ever with us, is in a state of flux; strains that are in the laboratory apparently identical may have entirely different pathogenic properties, and a human being may die of one that is relatively innocuous to a mouse. It is often, therefore, impossible to furnish definite proof that a given condition is due to streptococcal infection, however strong the presumptive evidence may be, and it is almost as dangerous to draw conclusions from the effect of this or that method of treatment, as it is to infer that, because a pathogenic strain of streptococcus is found in some obvious focus of infection, it is necessarily the cause of a given symptom. Nevertheless, I believe the establishment of a group of streptococcides is justified by the evidence that has accumulated from independent sources during the last few years, evidence that is at least as strong as that upon which the theory of the streptococcal origin of rheumatic fever is based. If we accept it, then, just as Swift and others have drawn a comparison between tuberculosis, syphilis, and rheumatic fever as regards their evolution, and their clinical and pathological pictures, so may we compare the cutaneous manifestations of such well-defined infections as tubercle, syphilis, and ringworm with those of the less tangible streptococcal infections. The great interest of such a comparison lies in this fact, that, with certain types of cutaneous or subcutaneous reaction, not only are the clinical appearances much the same whatever organism is responsible, but the histological pictures are similar in form, showing that the various defensive allergic reactions to infective organisms may depend rather on the tissues affected than on the nature of the infection.

I emphasise this point because, although I agree with Adamson in believing that such distinctive eruptions as lichen planus, psoriasis, and pityriasis rosea must be due each to its own specific micro-organism, this view cannot, in my opinion, be maintained in the types of eruption we are now going to consider. They are, as Darier puts it, *syndromes* that may be provoked by more than one infection, their different morphological and pathological characters depending on the anatomical structures involved and in their situation, and not on the infecting organism responsible for them. Darier, for example, points out that not only may a lichenoid follicular syphilide be clinically identical in appearance with lichen scrofulosorum, but that histologically it may be impossible to differentiate between the two. On the other hand, the same infection may produce two or more of these eruptions at one and the same time.

Nature of the Eruptions.

Let us now consider seriatim some of these types of eruption—the exanthematides as I have called them. Their nature is indicated in Table I.

(1) *The Lichenoid Eruption.*

This is a polymorphic eruption consisting of small papules, some plane like those of lichen planus, but the majority follicular, varying in colour from pale yellowish-brown to bright red. The follicular papules may be capped by a horny scale or plug (one form of lichen spinulosus), or by a vesico-pustule. This

Type of eruption.	Syphilides.	Tuberculides.	Trichophytides.	Streptococcides.
Papular lichenoid, usually follicular.	Lichenoid follicular syphilide.	Lichen scrofulosorum.	Lichen trichophyticus.	Lichenoid follicular eruption—e.g., in association with streptococcal impetigo.
Eczematoid.	—	Dermatitis scrofulosa (eczema scrofulosorum).	Eczematoid trichophytide.	Eczematoid, or frankly eczematous dermatitis associated with focal streptococcal infection.
Erythema multiforme.	(?)	(?)	Erythema multiforme trichophyticum (Bloch, Rasch).	Most cases of erythema multiforme of the classical and particularly of the recurrent type.
Erythema nodosum.	Doubtful.	Yes.	Yes (Bloch, Sutter, Pulvermacher, Bruusgaard.	Probably the great majority of cases.
Erythema circinatum.	Circinate tertiary syphilide.	Yes. (Darier.)	—	Erythema annulare centrifugum.
Erythema scarlatiniforme.	—	(?)	Yes. (Sutter, Bloch.)	Erythema scarlatiniforme recurrens. Scarlet fever.
Erythema induratum.	Yes. (Ravaut, Tzanck and Pelbois, Pautrier and Darier.)	True Bazin's disease.	—	Non-tubercular form (Whitfield) "Nodosités rheumatismales."
Lupus erythematosus.	(?) according to some authors.	Yes.	—	Yes.

form is represented, as will be seen in the table, by lichen scrofulosorum, the lichenoid trichophytide or microsporide, and by the lichenoid follicular syphilide.

Now Whitfield[29] was, I believe, the first to describe an eruption occurring in association with streptococcal impetigo, usually, but not necessarily secondary to pediculosis capitis. Let me quote his own admirable description:—

"The first sign to be added to those of the simple impetiginous lesion is the eruption of extremely fine miliary papules, situated at the orifices of the hair follicles of the sides of the back of the neck extending down nearly to the clavicles. These papules appear to be produced by the erection of the hair follicles, and are at first slightly if at all reddened. They may remain in this stage until they subside, or they redden and even become covered with minute vesicles, though this is uncommon. They resemble closely, except as to situation, the papules of lichen scrofulosorum."

It will be seen how nearly the description corresponds to that of the lichenoid tuberculide, syphilide, or trichophytide. I have recently seen a patient with a widespread streptococcal impetigo of the face and neck; on stripping him, there was found on the back and chest an ill-defined erythematous eruption, associated with groups of tiny follicular papules. At his second visit, when his impetigo had almost subsided, all trace of this secondary eruption had disappeared.

(2) *The Eczematoid Eruption.*

There has been considerable discussion as to whether one is justified in describing an eczematoid tuberculide—the eczema scrofulosorum of the older authors. In 1920, Attwater, Marshall and I[30] described a series of cases of an eczematoid dermatitis, occurring almost exclusively in children and adolescents as scaly patches of a characteristic fawn or pale brown colour, usually dry, but sometimes oozing—probably as a result of scratching or rubbing—and situated chiefly on the extensor surfaces of the limbs, the trunk, and on the face, particularly on the temples and forehead below the margin of the hair.

In about 80 per cent. of the cases described Marshall and Attwater were able to demonstrate definite signs of active tuberculosis. I christened the eruption "dermatitis scrofulosa." In 1926, Dowling and I[31] described a further series of these cases, and we showed (1) that exactly similar patches may arise de novo, and persist for some time in tuberculous children at the sites where Pirquet's cuti-test with tuberculin has been done, and (2) that in children with dermatitis scrofulosa patches identical in appearance and histological structure with those already present may be produced by applying tuberculin to the skin. We also observed cases of undoubted lichen scrofulosorum, in which patches of dermatitis scrofulosa were coexistent, and put forward the view that the latter is an eczematoid variety of the former. I am also of the opinion that the so-called "fausse teigne d'Alibert" is merely dermatitis scrofulosa occurring on the scalp.

Some years ago a child whom I had treated in infancy for eczema was brought to me for scaly patches on the limbs and trunk, which were characteristic of dermatitis scrofulosa, accompanied by slight generalised enlargement of the lymphatic glands. The practitioner in charge of the case was entirely sceptical of my opinion that the child had active tuberculosis, but a week later there occurred an outbreak of typical lichen scrofulosorum, and the late Dr. J. J. Pefkins confirmed the diagnosis of tuberculous adenitis.

Hügel, Eliascheff, and Schaumann[32] have recorded cases of lichen scrofulosorum in which the normal papular eruption was associated with "brownish red scaly patches of psoriasiform aspect." Schaumann found in microscopical sections infiltration with epitheloid and giant cells around the follicles.

Comparable to dermatitis scrofulosa is, I think, the eczematoid trichophytide described by Jadassohn and Guth, and the eczematoid microsporide by Finnerud.[33] It is generally agreed that they are varieties of the lichenoid trichophytide or microsporide, just as dermatitis scrofulosa may be regarded as a variety of lichen scrofulosorum. I believe that these eczematoid eruptions are due to the sensitisation of the epidermal cells to the toxins—tuberculin and trichophytin respectively—and the artificial production of dermatitis scrofulosa by applying tuberculin to the skin is in favour of this view. The other tuberculides and trichophytides, with the possible exception in some instances of the lichenoid varieties, are, of course, held to result from embolism of the actual organism, dead or living, and not to their toxins.

Can we recognise a comparable eczematoid streptococcide? I think we can with reasonable certainty. Whitfield remarks in his description of the lichenoid eruption associated with streptococcal impetigo of the scalp:—

"In some cases the secondary eruption is limited to this, but in others there occurs, after a variable number of days, an acute outbreak all over the chest, abdomen, and shoulders of an annular or figurate erythematous eruption with secondary scaling, such as would be classed in the ordinary way as a circinate seborrhœic eczema of the trunk."

This description tallies exactly with the description of eczematoid trichophytide and microsporide given by Guth and Finnerud respectively.

Like dermatitis scrofulosa this toxic eruption must be distinguished from the scaly, dry form of impetigo. Moreover, Whitfield,[34] Sutton,[35] Visher,[36] myself and others have drawn attention to eczematous eruptions associated with focal sepsis elsewhere—e.g., in the teeth or tonsils—in which the infective organism responsible usually seems to be a streptococcus.

To sum up—generalised eruptions of the lichenoid and, to a great extent, follicular variety, may occur in syphilis, tuberculosis, and trichophytosis, and, as a variant, an eczematoid form of dermatitis due to epidermal sensitisation can be recognised in the last two; eruptions similar in type occur in cases of focal streptococcal infection in the skin itself or elsewhere.

(3) *Erythema Multiforme.*

Unfortunately, the term erythema multiforme has been, and still is, used loosely to designate a variety of erythemato-urticarial and sometimes purpuric eruptions occurring, for example, after the ingestion of certain foods or drugs, and the injection of foreign sera. I would restrict it to an eruption which possesses definite enough clinical features, although few, I think, would claim it to be ætiologically specific.

Clinically, it is characterised by a symmetrical eruption of nummular erythematous papules, usually when fully developed of a characteristic dark lilac hue in the centre, pink or vermilion red at the periphery. To the touch they give a curious sensation like that of a rubber cap stretched over the mouth of a bottle full of fluid.

Numerous variations from this simple lesion may occur; thus the central portion may disappear leaving a ring (erythema annulare) which by excentric spread and intersection with similar rings may produce gyrate figures (erythema gyratum). Owing to the intensity of the serous exudation, vesicles or bullæ may form in the centre, and around these arise rarely the multi-coloured rings—erythematous or vesicular—giving the variety known as erythema or herpes iris; or from actual hæmorrhage the lesions may be purpuric.

The distribution is almost invariably the same, the backs of the hands, wrists and forearms, the elbows and knees, the dorsa of the ankles and feet, and the face being the sites of election. Sometimes the palms and soles are involved, the thick horny layer in these situations somewhat obscuring the characteristics of the papules. True erythema multiforme is one of the relatively few eruptions that affect the mucous membranes, particularly those of mouth, conjunctiva and vulva, and probably of the stomach and intestines, in view of the acute gastro-intestinal crises, so well described by Osler, that may rarely accompany the eruption.

Ætiology.—Excluding the rare cases of apparently classical erythema multiforme provoked by certain foods and drugs, and by infections such as gonorrhœa and enteric, or occurring after vaccination, we may say that several observers have stressed its association with manifest tuberculosis, and both Bloch and Rasch have described typical outbreaks in the course of suppurating ringworm, although at least one of Bloch's cases is open to question. But in the vast majority of cases of true erythema multiforme the eruption, I am convinced, is a manifestation of an acute or chronic infection with a streptococcus; particularly is this true of the recurrent form in which the mucous membrane of the mouth is usually involved, and in which acute attacks occur at intervals of from a few weeks to a year or more. In some cases the mucous membranes alone are involved, and the true nature of the attacks is often not appreciated until, perhaps, in one the cutaneous eruption appears.

For example, some years ago I was asked to see a girl who was supposed to be suffering from a syphilitic affection of the vulva and mouth, although the Wassermann reaction was negative. Inquiry revealed the history of former similar outbreaks, sometimes accompanied by a "rash" on the arms. Later she was admitted to hospital under my care for investigation, and very obligingly developed an attack of the oral and vulval lesions and an outbreak of generalised erythema multiforme, following a sore-throat with pyrexia. The tonsils, which were an obvious source of infection, were subsequently enucleated, and an autogenous vaccine from a streptococcus isolated from them was given; some weeks after her discharge she returned with a recurrence of her mucous membrane lesions and a typical eruption of *erythema nodosum* on the shins, which followed shortly after an injection of her vaccine. She ultimately ceased to have her attacks, but was kept under observation for some two years.

A considerable number of these recurrent cases have been investigated by me in association with Eyre, Knott, and Bulleid. In some of these investigation has been very complete, and the patients have been watched over long periods. Our experience may be summarised as follows: (1) There has usually been present some obvious source or portal of entry of infection, usually the nasopharynx and tonsils or the teeth, from which a predominant strain of streptococcus has been isolated. (2) Specific agglutinins to this strain have been found in the patient's serum. (3) Injection of a vaccine of the pathogenic streptococcus has in the majority of cases provoked at first abortive attacks of the erythema multiforme; this, I am aware, is not conclusive evidence of the specificity of the vaccine, but, as a control, other vaccines have been given without this result, and these focal reactions have been a very striking feature in these cases. (4) Of all the therapeutic methods employed—e.g., autohæmotherapy and non-specific protein injections—eradication or local treatment of the main source of infection followed by specific vaccine therapy over a long period has given the best results.

From a study of these cases of recurrent erythema multiforme, and of the conditions apparently due to chronic streptococcal infection, it would appear that the patient becomes infected by, and sensitised to, a strain of streptococcus which to him is specific, and which can often be recovered from various mucous surfaces—mouth, nasopharynx, and intestine. The presence of a "closed" focus of sepsis is by no means necessary; apart altogether from the tonsils, for example, the mucous membrane of the nasopharynx may be a potent source of infection. Apart from the presence in his blood of agglutinins specific for this particular strain, injection of it, even in small doses, may provoke a sharp general and focal reaction, exactly comparable to those induced by tuberculin in a person sensitised to tubercle, whereas he will tolerate quite large doses of other strains recovered from his own mucous membranes or from other patients.

The association of erythema multiforme with acute rheumatic fever, or with rheumatoid arthritis, is, to my mind, beyond question: I have seen it too often, both in my pre-dermatological days and since, to have any doubt on this point. Although the eruption both in its simple and recurrent form is usually not of serious significance, it may be so. Thus, some years ago, a child, at my request, was admitted to hospital for an acute attack of erythema multiforme, with swelling of the joints, following tonsillitis; endocarditis and pericarditis supervened, a streptococcus was obtained on blood culture, and the child died in a few weeks.

Quite recently a girl of 18 years was admitted under my care for erythema multiforme, of characteristic appearance and distribution, except that many of the lesions were purpuric. She had had recurrent attacks of tonsillitis during the previous six months. Shortly after admission another attack developed, accompanied by considerable fever, and with this a scarlatiniform erythema appeared on the face, limbs, and trunk, the erythema multiforme lesions being still present on the backs of the hands. There was an apical systolic bruit with dilatation of the left ventricle. Later an indurated area of cellulitis arose on the back of the neck, which broke down and discharged pus; from this an acute erysipelas spread downwards over the shoulders and back to the buttocks; in the centre of the back a considerable area of skin became gangrenous, and around this large bullæ formed. Pus from the original site of cellulitis gave a mixed growth of *Streptococcus pyogenes longus*, *Staphylococcus aureus*, and *Bacillus xerosis*; from the serous exudate in the lumbar region a pure growth of *S. pyogenes longus* was obtained.

In spite of injections of scarlatinal antistreptococcal serum the patient's condition grew steadily worse, and she died.

Post Mortem.—Soft vegetations were found on the posterior wall of the left ventricle, extending to the edge of the posterior cusp of the mitral valve, and covering the chordæ tendineæ and the apices of the papillary muscles. There was no evidence of previous valvular damage. The other findings

were those of an acute septicæmic infection—petechial hæmorrhages, staining of the intima of the heart and large vessels, fatty degeneration of the heart muscle and liver, and cloudy swelling of the kidneys, with three small recent white infarcts in the right one.

The points of interest in this case are: (1) The repeated attacks of tonsillitis associated with erythema multiforme of the purpuric type. (2) The simultaneous appearance of a scarlatiniform erythema with the erythema multiforme after her last attack of tonsillitis. (3) The development of an acute erysipelas followed by streptococcal septicæmia, with vegetations in the heart.

Another patient—a girl aged 17—came to me in November with a similar eruption of erythema multiforme of the purpuric type, associated with swelling of the left knee-joint, following tonsillitis. She refused admission, but consented after a second attack three weeks later, which subsided in hospital. On Feb. 7th she came again with a fresh outbreak of the eruption, and swelling of the left knee and right elbow-joints; in the interval both knees and elbow-joints had been swollen periodically.

(4) *Erythema Nodosum.*

What I have said concerning the ætiology of erythema multiforme is applicable also to erythema nodosum. These two terms should be reserved for well-defined types of eruption, the lesions of which are respectively characteristic in their appearance, distribution, and evolution. They are *clinical* entities, but they are not specific *morbid* entities. If this fact were only realised, all the discussion that has arisen as to the nature of erythema nodosum, and its relationship to rheumatic fever and tuberculosis, would cease. It is quite futile to attempt to restrict the term erythema nodosum to the "specific and separate disease" of which Trousseau wrote, or the "nodal fever" of Lendon,[37] and to deny, as many have done, its association with rheumatic fever, or its relationship to erythema multiforme. Odery Symes,[38] who is one of the sincerest exponents of this doctrine, himself described a remarkable family with a strong history of rheumatic fever on both sides, in which the mother had erythema nodosum, the eldest daughter developed the eruption after tonsillitis with arthritis, endocarditis, and pericarditis, and died; the fourth daughter had two, and the fifth and sixth daughters three attacks of erythema nodosum at intervals varying from one to five years. Surely Symes cannot hold that all these attacks were "nodal fever," a disease that is supposed to confer immunity? This familial incidence is occasionally met with in recurrent erythema multiforme, and two of my patients with this condition were twin sisters.

Symes will not admit that true erythema nodosum occurs in association with erythema multiforme, although he grants that "lesions on the fronts of the shins, resembling the nodes of erythema nodosum" may occur with the latter eruption, but I have seen absolutely characteristic erythema nodosum coexistent with erythema multiforme, and, as in the case already referred to, they may alternate in the same patient. With regard to the so-called nodal fever of Lendon, what astonishes me most is that none of those who have described cases or groups of cases under this term have apparently made any attempt to investigate the bacteriology of the condition. From the results of such investigation in other cases, it is probable that they are of streptococcal origin—possibly caused by a specific strain; the apparent infectiousness is not against this view, since certain strains of streptococcus are definitely contagious—e.g., that of scarlet fever and erysipelas.

The evident relationship in some instances between erythema nodosum and tuberculosis, which is granted even by the adherents to the "nodal fever" conception, has been widely discussed. It is clear, I think, from the critical survey of the literature—even neglecting the claims of Landouzy[39] and his collaborators to have demonstrated a tubercle bacillus in a vessel of a nodule, and to have tuberculised a guinea-pig with another portion of the same nodule—that erythema nodosum is definitely in some cases a tuberculide, but I believe it to be rarely so. That it is sometimes—in the great majority of cases in my opinion—a streptococcide is more certain, and positive blood cultures have been obtained in several cases.

Lastly, it is a rare form of *trichophytide*. In Bloch's first case there was an associated lichenoid trichophytide; the nodular lesions were indistinguishable from ordinary erythema nodosum, and gave a strong focal reaction after injection of trichophytin. Other similar cases have been published, but the most remarkable is that of Bruusgaard. He excised a very early nodule and was not only able to demonstrate the spores of the fungus in microscopical section, but actually succeeded in cultivating the ringworm fungus from this and other nodules, thus proving the hæmatogenous spread of the organism.

To sum up—erythema nodosum, like erythema multiforme, is not a specific morbid entity; it is probably in the majority of cases of streptococcal origin, less commonly a tuberculide, and it may rarely be a trichophytide.

(5) *Lupus Erythematosus.*

Although I have included lupus erythematosus among the eruptions, for which the general termination "ide" is employed, it clearly differs in nature from such conditions as the papulo-necrotic tuberculides and erythema nodosum or induratum, for the individual lesions tend to persist, and to spread peripherally, although they may in parts undergo spontaneous resolution with or without scarring. Clinically can be recognised:—

(1) The common form of the eruption, consisting of one or more indolent patches, varying in their degree of infiltration and their tendency to cicatricial atrophy: this is the fixed or discoid type.

(2) A subacute form in which the patches are more numerous and more widely distributed—usually symmetrically in regions where vascular stasis is most apparent—e.g., the "butterfly" area of the face, the ears, the V-shaped area over the manubrium sterni, and the hands, ankles, and feet.

(3) The acute form which usually succeeds the subacute and less commonly the fixed form, but may arise, as in the cases published by Pernet,[40] de novo. In this form the recent lesions are clinically hardly distinguishable from those of erythema multiforme. A large percentage of the cases die.

The ætiology of lupus erythematosus has been, and still is, the subject of much discussion and of experimental investigation. Civatte[41] in France, and Gray[42] in this country, have recently reviewed the whole subject. As with erythema nodosum, there are three opposing views: (*a*) That it is invariably of tuberculous origin. Ehrmann and Schaumann uphold this view, although their explanations of the genesis of the eruption differ. (*b*) That it is not a specific morbid entity, but may be produced by more than one infective organism or toxin. This, I believe, is now the commonly accepted view. The tubercle bacillus and a streptococcus are the organisms that have been held responsible more than any other. (*c*) That it is a specific infective disease, which is often accompanied or complicated by tuberculosis and streptococcal infection. This is the view put forward by Gray.

I cannot enter into a detailed discussion of these three theories. Although I am responsible for having expounded the streptococcal origin of the eruption in some cases, I am satisfied that in others tuberculosis is responsible, the proportion between the two groups of cases probably varying in different countries, and thus accounting, to some extent, for the difference in opinion about the relative ætiological importance of tuberculosis. In favour of a tuberculous origin, we have clinically the association of the eruption in some patients with manifest old or active tuberculosis and its coexistence with undoubted tuberculides, such as folliclis; and experimentally the claims of Gougerot,[43] Ehrmann and Reines,[44] Bloch and Fuchs,[45] and more recently Cannon and Ornstein,[46] to have produced tuberculosis in guinea-pigs by inoculation of tissue from lupus erythematosus lesions. Cannon and Ornstein, for whose work I have great respect, were successful in five cases of the disease out of 23.

Numerous authors have reported focal reactions after injection of tuberculin, and even acute generalised outbreaks have been thus provoked.

Dyson,[47] rubbed tuberculin and streptococcal ointments into the lesions in a number of cases, and out of 43 patients tested with tuberculin 30, or 68 per cent., gave positive reactions; of eight cases tested with streptococcal ointment 3, or 35 per cent., were positive.

That tuberculosis is, however, not the invariable cause would appear certain from the published post-mortem records of acute fatal cases, in which little or no trace of tuberculosis was found after the most careful search. Schaumann's attempt to reconcile this with his view that the eruption is always tuberculous is too complex to discuss now. The majority of fatal cases published recently have apparently died of streptococcal septicæmia, in some a pure culture of a streptococcus has been obtained from the blood during life, as in those recorded by Sibley[48] and Gibson.[49] Gray suggests this may have been due to a terminal infection, although in one of his own cases, in which a positive blood culture was obtained, the patient recovered.

Without pursuing the discussion further, I would emphasise the clinical similarity between erythema multiforme and lupus erythematosus, which was remarked upon by Galloway and MacLeod[50] many years ago. In the more acute forms of the latter, as I have said, the lesions are indistinguishable from those of the former, and both eruptions involve the mucous membranes of the mouth and conjunctiva. It is of interest, too, that, whereas erythema multiforme is not uncommonly associated with rheumatic fever, lupus erythematosus sometimes accompanies chronic rheumatoid arthritis. The eruption of erythema multiforme, although liable to recur, disappears without leaving any trace, and in rheumatic fever, though recurrence is the rule, the joints recover completely; lupus erythematosus, on the other hand, tends to persist and to produce scarring, just as rheumatoid arthritis is essentially chronic and liable to cause permanent damage to joint structures. One of the worst and most intractable cases of lupus erythematosus I have ever had under my care has mitral and aortic valvular disease dating from childhood, with auricular fibrillation, chronic rheumatoid arthritis chiefly of the finger-joints, and extensive lupus erythematosus of the face neck, and hands. The eruption has remained entirely unaffected by injections of sanocrysin and krysolgan, which are strikingly successful in the majority of those cases of the disease in which tuberculosis is the probable underlying cause.

(6) *Erythema Induratum.*

Under this term are included two types of indolent subcutaneous nodule.

The first type is merely a variety of the so-called hypodermic sarcoid, and is a subcutaneous tuberculide; commonly known in this country as Bazin's disease, it is seen almost exclusively in young girls with the condition of the legs that I described in my first lecture under the term "erythrocyanosis crurum puellaris"—i.e., fat, blue, œdematous legs, in which there is vascular stasis, most evident on the posterior external surfaces of the lowest third. Since the nodules of erythema induratum are of embolic origin, they occur most commonly, as one would expect, on the above area. The nodules may slowly resolve or may rupture and exude an oily fluid, the product of fat necrosis; in the latter case indolent ulcers, which become secondarily infected with pyogenic organisms, result. I believe that all genuine cases of this type are tuberculous; numerous successful animal inoculations with material from the nodules have been made both in this country and abroad; the patients give strongly positive cutaneous and intracutaneous tests with tuberculin, and marked focal reactions if this be injected. Like lichen scrofulosorum nodules may arise for the first time in a tuberculous person after a therapeutic injection of tuberculin. Not uncommonly, papulo-necrotic tuberculides and erythema induratum coexist in the same patient.

The second type was well described by Whitfield[51] many years ago. The lesions, I think correspond to the "nodosités rheumatismales" of the French. Whitfield says that he has seen it "exclusively in women of from 35–45 years of age, who have suffered from chronic rheumatism supervening on typical acute rheumatism" and he believes "that they are the result of septic absorption, often from the teeth."

I have recently seen a case of this sort in a middle-aged man, who consulted me for an indolent subcutaneous nodule above the right ankle, with considerable brawny œdema around it; later, several fresh smaller nodules appeared on the lower parts of both legs. He was found to have apical infection of several dead teeth, with considerable involvement of alveolar bone. These teeth were extracted, and a vaccine prepared from a streptococcus isolated. The nodules gradually disappeared, but a fresh one appeared after the third dose of vaccine. There has been no further recurrence.

It is possible, as Guy[52] suggests, that other organisms apart from the tubercle bacillus and a streptococcus may produce similar embolic subcutaneous lesions.

Pathological Anatomy.

A study of the pathological anatomy of these allergic eruptions is of extreme interest, but I can only deal with it very briefly. As might be expected, the changes are for the most part centred round the vessels either of the dermis or hypodermis. A comparison may well be made between the histological picture presented by some of these lesions and that of Aschoff's nodules in the myocardium of cases of acute rheumatism, and of the subcutaneous nodules, both of this disease and of chronic infective arthritis, which, as Carey Coombs[53] emphasises, must also be of embolic orgin.

One may ask upon what depends the differences between these various types of eruption, seeing that some of them can be provoked by widely different organisms; or, for that matter, why does the circulation of the same organism—e.g., the tubercle bacillus—give rise in some cases to a lichenoid eruption, in others to a papulo-necrotic lesion, in others to an erythema induratum or nodosum? I think the chief factor determining the type of lesion is the localisation of the embolised organism or the action of its toxin.

In eruptions such as the roseola of syphilis the organism presumably comes to rest in the superficial capillaries of the skin; in the lichenoid eruptions, the inflammmatory reaction is also superficial, in the papillary body or more particularly around a pilo-sebaceous follicle; in the papulo-necrotic type it is deeper in the dermis. In erythema nodosum and erythema induratum the reaction takes place around a vessel in the subcutaneous tissue. From the observations of Hadfield, recorded in Symes's recent book, made on material supplied by the latter, it appears that the essential lesion in erythema nodosum is "an acute and widespread *arteriolitis* in the subcutaneous fat, resolving rapidly without suppuration." His statements that a recent lesion "showed all the phenomena of acute inflammation, such as follows the actual presence of pyogenic cocci in the subcutaneous tissue," and that "it would have been permissible from an examination of the recent lesion alone to form the opinion that suppuration was likely to occur in it," are of great interest. They suggest that in the cases from which the material was taken were of streptococcal origin. Hadfield failed to find cocci, and he concludes that the lesion is "due to a circulating toxin," but this opinion does not take into account the essential nature of these allergic eruptions—namely, the rapid destruction of embolised organisms.

In erythema induratum Schaumann has adduced evidence to show that the embolism occurs in one of the vasa vasorum of a subcutaneous vein—the lesion being essentially a *phlebitis*.

In both erythema nodosum and erythema induratum there is extensive fat necrosis, the products of which are absorbed by histiocytes and giant cells.

Factors Predisposing to the Occurrence and Localisation of these Eruptions.

I have already indicated, when discussing the tuberculides and trichophytides, that there are two factors essential for the occurrence of these and similar eruptions—namely, the presence of the causal organism or its toxin (the antigen), and the sensitisation of the tissue cells in the skin or subcutaneous tissue—i.e., the presence in them of antibodies. The various lesions constituting the eruptions are inflammatory reactions resulting from contact of the antigen with the antibodies of the specifically sensitised cells. This phenomenon constitutes "allergy" in the sense originally employed by Pirquet; of late, however, the term has been given a wider significance, as I shall point out in my next lecture, although its essential meaning remains the same.

As Bloch[54] says: "It is clear that an organism which possesses or has acquired (by previous contact) such specific antibodies, will react to the application of the specific antigen differently from an organism which does not possess such antibodies (allergy = different reaction)." Bloch also makes the following deduction, which to my mind is of fundamental importance, both with regard to the eruptions we have been considering and to allergic reactions in general: "The type and course of the allergic reaction are independent of the nature of the antigen, but vary according to the localisation of the antibody—that is, according to which organ reacts to the antigen."

Now until recently it has been held that in true anaphylaxis and allergy the antigen must be a protein, but this view is no longer tenable; it is, in fact, highly probable that the actual specific antigenic bodies, no matter what their source, are non-protein substances of relatively simple chemical composition. This question I shall refer to also in my next lecture. For our present purpose, if this be accepted, it is clear that it is of no consequence whether the various eruptions—tuberculides, trichophytides or streptococcides—are produced by the actual causal organisms, or by their toxins, circulating in the blood stream, and reaching the sensitised tissue of the skin or subcutaneous tissue, since the antigenic substance is presumably present in both. Given, however, the *essential* factors for the production of these eruptions—namely, sensitisation of the cutaneous or subcutaneous tissues, and the access to them via the blood stream of the specific antigen—there are, nevertheless, certain other factors predisposing to their occurrence and distribution. Of these I think the most important are: (1) circulatory stasis in the skin and subcutaneous tissue of certain areas; and (2) the action of physical agents such as light, heat, and cold.

This question has been dealt with by Adamson,[55] both in his Goulstonian Lectures and in a more recent communication, and by Lewis[56] in his work on the blood-vessels of the human skin.

It is obvious that, in the case of eruptions dependent upon circulatory micro-organisms or their toxins, stasis in the blood-vessels of a given area will predispose to the embolism of the former or the more prolonged noxious action of the latter. This influence of circulatory stasis is clearly seen in erythema induratum, in the papulo-necrotic tuberculides, in lupus erythematosus, and to a less extent in erythema multiforme and nodosum. Moreover, Adamson has suggested that the roseolar and papular eruptions of secondary syphilis arise at the angles of the vascular network, demonstrated many years ago by Renault—i.e., at the sites of maximum capillary stasis. This network is revealed in certain subjects by exposure of the skin to cold (livedo annularis), or to prolonged heat (erythema or ephelis ab igne), both of which agents increase the stasis in the vessels of low tone farthest away from the central arteriole. Lewis has shown that these vessels are irresponsive to adrenalin and refractory to histamine.

The second factor—namely, the action of light in determining outbreaks and the localisation of certain of these eruptions, is illustrated by some cases of erythema multiforme and lupus erythematosus.

One of my patients with recurrent erythema multiforme, who formerly had frequent attacks, now has one annual attack, which invariably occurs when she first exposes herself to strong sunlight in spring or early summer.

Another, a little girl, whose erythema multiforme began after scarlet fever, was always free in winter, but developed fresh lesions every time she was exposed to sunlight. She was comparatively free last summer, after enucleation of septic tonsils and subsequent vaccine treatment. In her case there was little doubt that her skin became sensitised to a *Streptococcus longus* at the time of her scarlet fever. This provoking action of sunlight is also seen in some cases of lupus erythematosus.

Significance and Value of the Cutaneous and Intracutaneous Tests.

When we survey the problem of rheumatic fever and rheumatoid arthritis on the one hand, and of some of the eruptions with which I have just dealt—such as erythema multiforme, erythema nodosum, and lupus erythematosus—on the other, we are struck by one very significant fact—namely, that the chief point of controversy concerning their ætiology centres round the streptococcal group of organisms. Personally, I am satisfied that erythema multiforme of the classical type and erythema nodosum are, in the majority of cases, streptococcides, and that the latter, at any rate, may less commonly be a tuberculide; with regard to lupus erythematosus, I think the evidence that it is sometimes of tuberculous origin is conclusive, and, since in 1915 I first put forward the view of its streptococcal origin in certain cases, confirmatory evidence has accumulated in favour of my claim. I believe that it is often possible clinically to distinguish between the tuberculous and the streptococcal form from the appearance of the eruption.

I have already referred to the difficulty of establishing beyond question the streptococcal origin of a given eruption, or, for that matter, of general diseases such as rheumatic fever or rheumatoid arthritis. I think, however, that valuable evidence might be obtained by carefully controlled intracutaneous tests with emulsions or preferably filtrates of streptococci, such as have been employed by Birkhaug,[57] Strauss,[58] Kaiser,[59] Swift and his co-workers, in their researches on rheumatic fever. This leads me, however, to a consideration of the whole question of diagnostic cutaneous tests with tuberculin, trichophytin, and similar extracts.

With regard to the tuberculin test, I agree with Burhans[60] and Lyle Cummins[61] that the intradermal method of Mendel[62] and Mantoux[63] is preferable to the cutaneous test of Pirquet. I believe that the significance of these tests is widely misunderstood, and it is for this reason that by many they are regarded as comparatively useless. To my mind they afford evidence of one thing and one thing only—namely, that the skin is sensitised to the specific antigenic substance of the infective organism in question. It follows that a positive reaction indicates that an infection with the particular organism has taken place and that there is cutaneous allergy towards it; a negative one excludes the latter, but *not* the former. Lyle Cummins says: "Tuberculin sensitivity is at its height in healthy but infected adults, and is still high in those tuberculous persons in whom the disease is taking a relatively benign course, and it tends to diminish with the gradual deterioration of health consequent on advancing tuberculosis." This statement is true, but it does not emphasise the real meaning of his observations. Since a positive cutaneous or intracutaneous reaction is an index of the degree of cutaneous allergy, it follows that the higher the latter the stronger the reaction. As one would expect, therefore, it is in patients with tuberculide eruptions, which depend for their occurrence on an allergic state of the skin, that some of the strongest reactions are obtained.

As I shall point out later, cutaneous allergy is a protective mechanism against more serious visceral involvement; it disappears for a while after acute infections such as measles, during which time also

the Pirquet and intradermal tests become negative; and in advanced cases of tuberculosis, when the protective function of the skin has failed, these tests diminish in intensity.

Colliver[64] has shown that in tuberculosis the Pirquet test, if positive, gives the same degree of reaction in different areas, but this is not so in trichophytosis, in which, of course, the primary site of infection is always in the skin itself. This is shown by the experiments of Pedersen[65] and of Sutter[66] with trichophytin.

Pedersen tested nine cases of suppurating ringworm without secondary trichophytides, with trichophytin by Pirquet's method. All gave positive reactions on the abdomen, seven were positive on the arm, and only four on the leg. The abdomen is one of the chief sites of election for the trichophytide eruptions. Pedersen also tested six cases in which secondary trichophytides were present. All were positive on the abdomen and upper arm where the trichophytides were situated, and only two on the leg where there were no trichophytides. He and Sutter both showed that the cutaneous reaction was always strongest near the site of the suppurating ringworm infection.

From their analogy to the tuberculides and trichophytides the eruptions that I have termed streptococcides should be accompanied by a simliar cutaneous allergy towards streptococcal antigen, and positive cutaneous or intracutaneous tests should be obtained with it. An obvious difficulty, however, is the question whether the actual antigenic substance is common to the streptococcal group as a whole, or whether different strains have their own specific substance.

I have already referred to the tests carried out by several workers with emulsions or filtrates of streptococci in rheumatic patients. Recently Forman, in my clinic, has made intradermal tests with streptococcal emulsions, using staphylococcal emulsions and normal saline as controls, in patients with eruptions that I consider to be streptococcides, in apparently normal subjects, and in patients with other diseases. So far as our observations go, this line of research has given significant and promising results.

The Rôle of the Skin in the Defensive Mechanism of the Body.

I have already referred to the importance of impaired function of the skin as a predisposing factor to the development of rheumatic conditions, and in my first lecture I emphasised the relationship between the skin and the activity of the endocrine glands, particularly the adrenals and thyroid, and of the autonomic nervous system, upon which the resistance of the tissues to certain bacterial infections, as Cramer's work suggests, appears largely to depend.

Llewellyn, Gordon, and Gunzberg, in their remarks at the Bath Conference, all laid stress on the symptoms of disordered cutaneous circulation and sweat secretion that are so apparent in rheumatic subjects, and Langdon Brown, Thomson, Pringle, and Strauss dealt with the endocrine factors.

I think it will be generally admitted that, apart from removal and treatment of definite sources of infection, and the employment of vaccines in suitable cases, the methods of treatment in chronic rheumatic conditions which have proved of most value depend very largely, as Howitt[67] has recently emphasised, on stimulation of the skin, whether by increasing the secretion of sweat, or by flushing the cutaneous blood-vessels, or by producing in it a definitely inflammatory reaction, as with erythema doses of ultra-violet light, or the deliberate application of irritant substances. By these various methods one can utilise the excretory function of the skin, increase tissue oxidation, stimulate the adrenal-thyroid-sympathetic system, as by alternate hot and cold douches, and lastly produce what is apparently mild protein shock, which, after a preliminary leucopenia, leads to a considerable leucocytosis and an increase in the bactericidal power of the blood. It is my contention that susceptibility to active infection with the less virulent types of streptococci, as well as with some other organisms, such as the tubercle bacillus, is dependent largely on the prevention of the normal physiological functions of the skin by the unnatural conditions imposed by civilisation, and that by far the most effective treatment for such infection, when it has occurred, is the restoration of those functions by all the means at our disposal.

Apart from this, however, in conclusion I would raise a question that to my mind is of profound interest and importance—namely, that, when active infection is present, to what extent do the cutaneous manifestations of such infection constitute a protective mechanism against invasion of deeper and more important organs? May not the rashes of the acute exanthemata, and of the more chronic infections such as syphilis and tubercle, represent part, at any rate, of the body's campaign against the invading organism, since, as we know, they represent antigen-antibody reactions designed to destroy the former in situ? May not, in fact, recovery from an acute exanthem be partly dependent on the rash?

The evidence in favour of this view is very strong. The popular conception of most skin eruptions is that they represent an effort to drive out some poison from within, and anxiety is often expressed about the danger of driving it in again! We should not be too ready to dismiss this idea as an ignorant superstition. Brocq[68] has long upheld the view—earning for himself much scorn in so doing—not only that certain eruptions alternate with various visceral and nervous disorders, which is an indisputable fact, but that the successful treatment of the former may precipitate an attack of the latter, which in turn may be promptly relieved by exciting an inflammatory reaction in the skin. On this idea depend the older methods of treatment by blistering, setons, cupping, scarifications, and the like. We now attempt to treat the underlying infection or toxæmia, on which both the cutaneous and visceral symptoms depend.

In tuberculosis it has long been recognised that patients who suffer from tuberculides and lupus vulgaris are comparatively immune to the more deadly forms of this disease, such as actively progressive phthisis. According to Burnet,[69] it is probable that the skin of all the tissues is that which lends itself best to the spontaneous attenuation of the tuberculous virus. "It is not a matter of indifference," he says, "for a tubercular person that his skin be affected before his lung, or his lung before his skin, and his phthisis is without doubt not the same as if his skin were not involved." Moreover, we know that should the severer forms of visceral involvement, or a general miliary tuberculosis supervene in a patient with tuberculides or lupus, the skin lesions automatically disappear, and the Pirquet reaction—the index of cutaneous allergy—often vanishes with them.

In syphilis it is common knowledge how seldom tabes and general paralysis occur in those who have had severe cutaneous manifestations. Years ago when I was investigating the histories of large numbers of tabetics, I was struck by the fact that few of them retained any recollection of a syphilitic eruption. Moreover, the recent publication by Bruusgaard[70] must give us pause. His predecessor, Boeck, always taught that mercury and iodide were symptomatic remedies, which not only fail to cure the disease, but actually paralyse the body's natural defences, so that when they are administered the infection runs an atypical course, and is much more liable seriously to damage internal organs, particularly the central nervous system. This, of course, was in the pre-salvarsan days. Boeck only employed these drugs in cases in which the disease failed to run its natural course. Bruusgaard and Dählstrom in an exhaustive analysis of Boeck's old patients (some of whom, no doubt, did receive mercury and iodide from other doctors), found that only 0.6 per cent. developed general paralysis, as compared with the usual computation of 4 per cent.

In ringworm (trichophytosis) we know from Bloch's experiments that immunity to reinfection is a function

of the allergic condition of the skin cells. In human favus the cuti-reaction is almost always negative, showing that to this fungus (*Achorion schönleinii*) the skin fails to develop antibodies; this fact may well explain why human favus is a chronic disease without any tendency to spontaneous cure.

Lastly, when we come to the eruptions that in my opinion may legitimately be termed rheumatic, or at any rate streptococcides, cannot we detect the same protective rôle against visceral damage? Those, who like Gosse,[71] Lendon, and Symes, base their opinion that erythema nodosum is not a rheumatic disease on the fact that it is comparatively seldom associated with permanent damage to the heart or with chorea, and that it infrequently recurs, have, I believe, failed to grasp the whole story of rheumatic infection, and to understand the significance of its cutaneous manifestations. One might equally well argue that gummata are not syphilitic because they so seldom occur in tabetics and paralytics, or vice versa. That erythema nodosum *is* sometimes associated with typical rheumatic fever and its cardiac complications is certain. That the association is not more frequent is, I submit, because as with the tuberculides and syphilides, the allergic state of the skin on which it depends protects the more vital organs. The same may be said of erythema multiforme.

CONCLUSIONS.

(1) My conclusions are that one may justifiably compare tuberculosis, syphilis, and rheumatism.

(2) That there is increasing evidence that rheumatic fever and some of the chronic forms of rheumatic disease are due to streptococcal infection.

(3) That certain cutaneous manifestations of these three infections and of the severer forms of ringworm are comparable and sometimes indistinguishable; and that they depend on an allergic condition of the skin.

(4) That this allergic condition of the skin is to some extent a protective mechanism against involvement of more vital organs.

(5) That interference with the normal physiological functions of the skin, such as is bound to occur in the majority of persons living under civilised conditions, is an important factor in predisposing to active infection with certain organisms, such as the tubercle bacillus, and with the common saprophytes of the mucous membranes and skin.

REFERENCES.

1. Poynton, F. J., and Paine, A.: THE LANCET, 1900, ii., 861. 932.
2. Small, J. C.: Amer. Jour. Med. Sci., 1927, clxxiii., 101.
3. Birkhaug, K. E.: Jour. Infect. Dis., 1927, xl., 549.
4. Lazarus-Barlow, P.: Proceedings of Conference on Rheumatic Diseases, Bath, 1928, p. 152.
5. Swift, H. F., Derick, C. L., and Hitchcock, C. H.: Ibid., p. 157.
6. Swift, H. F.: Amer. Jour. Med. Sci., 1925, clxx., 631.
7. Bezançon, F., and Weil, M. P.: Ann. de Méd., 1926, xix., 81.
8. Calmette, A.: L'infection Bacillaire et la Tuberculose chez l'Homme et chez les Animaux, Paris, 3rd edit., 1928, p. 202.
9. Holt, L. E.: Jour. Amer. Med. Assoc., 1913, lxi., 99.
10. Boeck, C.: Medicinsk Revue, 1911, p. 500.
11. Bruusgaard, E.: vie Congrès de la Soc. Derm. du Nord Helsingfors, 1925, p. 19.
12. Darier, J.: Ann. de Derm. et de Syph., 1896, vii., 143.
13. Schaumann, J.: Ibid., 1926, vii., 193 and 279.
14. Koch, R.: Deut. Med. Woch., 1891., xcii., 101.
15. Sequeira, J. H.: Brit. Jour. Derm., 1915, xxvii., 371.
16. Gougerot, H., and Laroche, G.: Arch. de Med. exper. et d'Anat. path., 1908, v., 581.
17. Lewandowsky, F.: Arch. f. Derm. u. Syph., 1916, cxxiii., 1.
18. Jadassohn J.: Korrespond. f. Schweiz. Ärtze, 1912, xlii., 22; Berlin klin. Woch., 1918, lv., 489.
19. Guth, A.: Arch. f. Derm. u. Syph., 1913, cxviii., 856.
20. Sutter, E.: Derm. Zeit., 1917, xxiv., 65.; Arch. f. Derm. u. Syph., 1920, cxxvii., 735.
21. Bloch, B.: Korrespond. f. Schweiz. Ärtze, 1912, xlii., 3.
22. Rasch, C.: Brit. Jour. Derm., 1916, xxviii., 9.
23. Pulvermacher, L.: Derm. Zeit., 1919, xxvii., 11.
24. Jessner, M.: Arch. f. Derm. u. Syph., 1921, cxxxvi., 416.
25. Ambrosoli, G. A.: Giorn. Ital. d. mal. ven. e della pelle, 1921, iii., 233.
26. Bruusgaard, E.: Brit. Jour. Derm. and Syph., 1922, xxxiv., 150.
27. Neisser, A.: Arch. f. Derm. u. Syph., 1902, lx., 63.
28. Sabouraud, R.: Pyodermites et Eczémas, Paris, 1928, p. 199.
29. Whitfield, A.: THE LANCET, 1921, ii., 168.
30. Barber, H. W., Attwater, G. L., and Marshall, G.: Brit. Jour. Derm. and Syph., 1921, xxxiii.,154.
31. Barber, and Dowling, G. B.: Proc. Roy. Soc. Med., 1926, xix., 33.
32. Schaumann, J.: Tuberculides, iii^e., Congrès des Dermatologistes et Syphiligraphes, Brussels, 1926.
33. Finnerud, C. W.: Brit. Jour. Derm. and Syph., 1925, xxxvii., 67.
34. Whitfield, A.: THE LANCET, 1921, ii., 168.
35. Sutton, R.: Diseases of the Skin, St. Louis, 6th edit., 1926, p. 251.
36. Visher, J. W.: Amer. Jour. Med. Sci., 1925, clxx., 723.
37. Lendon, A. A.: Nodal Fever, London, 1905, and Brit. Med. Jour., 1925, i., 651.
38. Symes, J. Odery: Erythema Nodosum, Bristol, 1928.
39. Landouzy, L. Laederick, and Richet: Press Méd., 1913, xxi., 1045.
40. Pernet, G.: Lupus érythémateux aigu d'emblée, Paris., 1908.
41. Civatte, A.: Ann. de Derm. et de Syph., 1926, vii., 465.
42. Gray, A. M. H.: Brit. Jour. Derm. and Syph., 1926, xxxvii., 406.
43. Gougerot, H.: Rev. de la Tubercul., 1908, v., 345.
44. Ehrmann, S., and Reines, S.: Med. Klin., 1908, iv., 1298.
45. Bloch, B., and Fuchs, H.: Arch. f. Derm. u. Syph., 1913, cxvi., 722.
46. Cannon, A. B., and Ornstein, G. G.: Ibid., 1925, xii., 691.
47. Dyson, W.: Brit. Jour. Derm. and Syph., 1925, xxxvii., 401.
48. Sibley, W. Knowsley, and Wynn, W. H.: Ibid., 1923, xxxv., 323.
49. Gibson, R.: Ibid., 1925, xxxvii., 232.
50. Galloway, J., and Macleod, J. M. H.: Ibid., 1903, xv., 81.
51. Whitfield, A.: Ibid., 1909, xxi., 1.
52. Guy, W. H.: Arch. Derm. and Syph., 1923, viii., 754.
53. Coombs, Carey, F.: Proceedings of a Conference on Rheumatic Diseases, Bath, 1928, p. 136.
54. Bloch, B.: Arch. Derm. and Syph., 1929, xix., 175.
55. Adamson, H. G.: Modern Views upon the Significance of Skin Eruptions. Goulstonian Lectures, London, 1912; and Brit. Jour. Derm. and Syph., 1924, xxxvi., 1.
56. Lewis, T.: Blood Vessels of the Human Skin and their Responses, London, 1927, p. 286.
57. Birkhaug, K. E.: Jour. Infect. Dis., 1927, xl., 549.
58. Strauss, H.: Deut. Med. Woch., 1927, liii., 737.
59. Kaiser, A. D.: Jour. Infect. Dis., 1928, xlii., 25.
60. Burhans, C. W.: Jour. Amer. Med. Assoc., 1927, lxxxix., 1299.
61. Cummins, S. Lyle: Brit. Med. Jour., 1929, i., 336.
62. Mendel, F.: Med. Klin., 1908, iv., 402.
63. Mantoux, C.: Compt. rend. Acad. des Sci., 1908, cxlvii., 335.
64. Colliver, J. A.: Arch. Pædiat., 1915, xxxii., 92.
65. Pedersen, M. D.: Derm. Zeit., 1917., xxiv., 731.
66. Sutter, E.: Ibid., 1917, xxiv., 65.
67. Howitt, F. D.: Brit. Med. Jour., 1929, i., 338.
68. Brocq, L.: Cliniques Dermatologiques, Paris, 1924, p. 72.
69. Burnet, E.: Ann. de l'Inst. Pasteur, 1912, xxvi., 868: Soc. de Biol., 1912, lxxiii., 384.
70. Bruusgaard, E.: Norsk Magazin. f. Lægevidenskaben, Dec., 1928.
71. Gosse, A. H.: Practitioner, 1913, lxxx., 240.

FURTHER OBSERVATIONS ON THE HISTOLOGY OF CARCINOMA OF THE BREAST.

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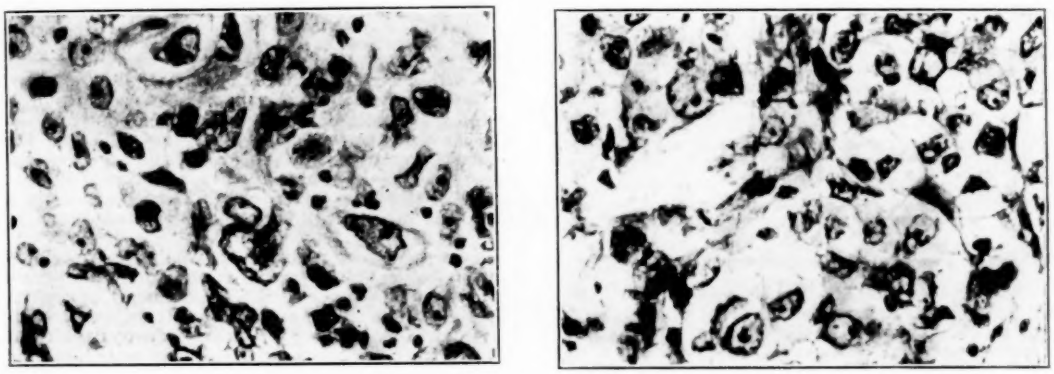
WITHIN recent years many investigations have been conducted with the object of ascertaining the relationship, if any, which exists between the varied histological pictures presented by carcinomata of similar organs and their response to treatment, either surgical or radiological. As a result, certain workers (e.g., Broders, Healy, Greenhough), have concluded that an index of malignancy based on the histological features should prove of value clinically. As a rule it has been found that attention is best directed to the actual tumour cells, neglecting or paying small attention to stromal changes.

In a previous communication [1] we brought forward evidence to show that in the case of carcinoma of the breast such a relationship between the histological appearance and the subsequent clinical course of the disease does exist; but we came to the conclusion that the histological index of malignancy should be used only as an auxiliary to other factors, and that the important point was the stage to which the disease had advanced at the time the treatment was

undertaken. In actual practice it was believed that the histological malignancy should prove of prognostic value in cases in which the disease had spread from the breast to the axillary glands, but had not yet widely infiltrated those glands—i.e., a group intermediate between the early and the advanced cases of carcinoma of the breast. In furtherance of this work, we thought it might be of interest to study the relationship between the histological appearance of the primary growth and that of its secondary deposits. The results of such an investigation are herewith recorded (A). In addition, under (B) the histology of those tumours of the breast which have given rise to metastases in the glands is compared with the appearances of those growths in which microscopical examination of the axillary glands has failed to demonstrate metastases.

FIG. 1.

A.—Primary tumour. B.—Secondary deposit in axillary gland.



The tumours are identical in appearance and malignancy. (The majority of the cases were in this category.)

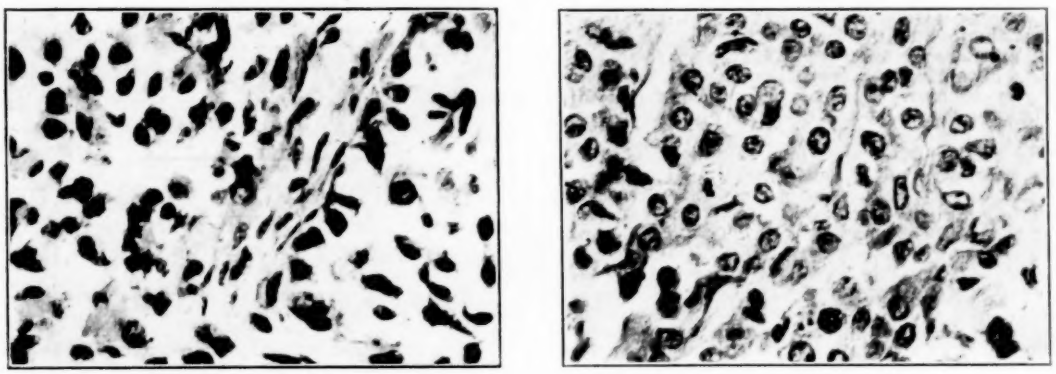
(A.) *The Relationship between the Histological Appearances of the Primary Growth and its Secondary Deposits.*

In spite of its apparent importance no detailed accounts of the comparative histology of primary carcinomata and their secondary deposits have been traced, although generalisations on the subject are not infrequent. Ewing,[2] discussing carcinomata in general, states that "in metastatic deposits preservation of structural type is often remarkable yet, as a rule, there is increased anaplasia and more rapid growth in metastatic tumours." Delbet and Mendaro,[3] on the other hand, speaking of breast carcinomata, say that the secondary deposits in lymphatic glands are often more differentiated than the primary tumours. In neither case are examples quoted, nor is any detailed analysis given.

The material examined consisted of the microscopic sections of 110 consecutive cases of carcinoma of the breast submitted to the operation of radical removal at the Middlesex Hospital, from 1926 to 1928 inclusive, in which histological examination showed metastasis in the axillary lymph nodes. The method of study of the cases was identical with that used previously, and the material was classified into three groups, Group I. representing a low and Group III a high degree of malignancy.

FIG. 2.

A.—Primary tumour (Group 3). B.—Secondary deposit (Group 2).



The secondary deposit is less malignant than the primary growth.

The criteria adopted in assessing the malignancy have already been given,[1] and briefly are those changes which indicate the degree of departure from the structure and arrangement of normal breast epithelium. The three characters on which most stress has been laid are: (1) tubule formation; (2) irregularity in size and shape of nuclei; (3) hyperchromatism. Other factors which have been noted are: (4) the amount of secretion and (5) the number of mitoses.

No attention has been paid to the presence of fibrosis, leucocytic infiltration, nor any factor not directly concerned with the appearance of the epithelial cells.

In order to obtain an opinion as unbiased as possible the sections of all the primary tumours were first examined, and then independently the sections of the secondary deposits. Each primary growth was then compared with its metastases, and any differences noted on the independent examination were discussed and, if necessary, confirmed.

The results of the analysis are summarised in Table I.

TABLE I.—*Showing Numbers of Cases with and without Changes in Malignancy of Metastases.*

Histological group of primary.	No. of cases.	Metastases in same group.	Metastases in lower group.	Metastases in higher group.
1. Low malignancy	24	24	—	0
2. Moderate ,,	39	28	10	1
3. High ,,	47	39	8	—
Total	110	91	18	1

It will be seen that, of the 110 cases studied, in 91 the breast and glands were classified as being similar in histological type and malignancy; of the remaining 19, in 18 the secondary deposits were placed in a lower category than their corresponding primaries, whilst in only one instance was it found that the glandular deposits had been placed in a higher category. As a result of these findings, one may say that in the large majority of cases of carcinoma of the breast (approximately 83 per cent. in this series) the histological malignancy of the secondary deposits in the axillary glands is almost identical with that of the primary tumour; in an appreciable minority (16 per cent.) the secondary deposits have a less malignant appearance, whilst only rarely (one case) does the growth in the glands appear more malignant than the primary tumour.

Discussion.—With regard to the practical application of this investigation two points of importance suggest themselves. In the first place it is seen that in assessing the malignancy of carcinoma by histological means attention should be directed to examination of the primary growth. Furthermore, it is obvious that it would be useless to look for signs of prognostic value in the primary growth if, in many cases, the metastases were of a higher malignancy, as each secondary growth would serve as a focus for the spread of carcinoma more malignant than the original primary tumour. But the investigation has shown that in the breast, at any rate, this occurs so rarely as to be negligible.

The other point upon which this investigation has some bearing is that of radium treatment. It is well recognised that, in many situations, the radium treatment of lymphatic secondary deposits is less successful than that of the primary growth. The question arises whether this is due solely to difficulties of access or whether other factors, such as alteration in the radiosensitivity of the growth cells, are concerned. Regaud,[4] Healy,[5] and other workers maintain that the more differentiated a tumour the less is its response to radium. If this hypothesis be correct, since in the breast the large majority of the glandular secondary deposits have a similar appearance to that of the primary growth, they should react in the same way to radium; but in the occasional case in which the growth in the gland is more differentiated this secondary growth might prove more refractory to radium.

(*B.*) *Histological Malignancy and Metastasis.*

During the period in which the above 110 cases of carcinoma of the breast with axillary secondary deposits were encountered there were 53 cases which showed no secondary deposits. These 53 cases constitute 32·5 per cent. of the total number which underwent the radical operation, a figure which agrees closely with that of 30 per cent. quoted by Barling for the cases in the Birmingham Hospitals.[6] They also were examined and classified in the manner noted above, and the reults are given in Table II.

TABLE II.—*Histological Malignancy and Metastasis.*

Histological group of primary.	Total No. of cases.	No. with metastases (from Table I.).	No. without metastases.
1. Low malignancy ..	54	24	30
2. Moderate ,, ..	57	39	18
3. Marked ,, ..	52	47	5
Total	163	110	53

It will be seen that more than half (56·6 per cent.) of the cases which have not metastasised are of low histological malignancy, whilst only about one-tenth (9·4 per cent.) are in the high category. When these results are compared with those of the tumours which have shown secondary deposits a striking difference is noted, as of the latter only 22 per cent. are in the low grade, whereas 43 per cent. of the tumours are of high malignancy.

These results, in addition to verifying the relationship between histological appearance and clinical malignancy, support the conclusion previously expressed that in a carcinoma of the breast of low histological malignancy the early or favourable stage is of longer duration and that patients are more likely to present themselves for treatment before there has been much spread of the disease.

Summary.

(1) 110 carcinomata of the breast with their secondary deposits in the axillary glands, and 53 cases without secondary deposits have been examined from the point of view of the histological appearances of malignancy. (2) In the large majority of instances (83 per cent.) the secondary deposits in the lymphatic glands are similar in appearance and malignancy to the primary growth; in an appreciable minority (16 per cent.) the malignancy of the glandular metastases is lowered, but only in one case is the malignancy raised. (3) The series of cases in which secondary deposits have not been found in the axillary glands shows a relatively much greater number of tumours of low histological malignancy than does the series with such deposits.

References.

1. Patey, D. H., and Scarff, R. W.: THE LANCET, 1928, i., 801.
2. Ewing, J.: Neoplastic Diseases, Philadelphia, 1928, p. 87.
3. Delbet, P., and Mendaro, A.: Les Cancers du Sein, Paris, 1927, p. 58.
4. Regaud, C.: Rep. Internat. Conference on Cancer, London, 1928, p. 64.
5. Healy, W. P., and Cutler, M.: Amer. Jour. Obst. and Gyn., 1928, xvi., 15.
6. Barling, G.: Rep. Internat. Conference on Cancer, London, 1928, p. 170.

THE OCCUPATIONAL DISEASES OF HOP-PICKING.

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THERE are three recognised affections due to hop-picking, and seen only among hop pickers. These are known as "hop rash," "hop eye" and "hop gout," and are familiar to those who have worked in and among hop gardens. The literature concerning them is, however, scanty.

Hop Rash.

The first mention of hop rash was made by Badham[1] in 1834, who contracted a dermatitis as the result of putting his own chapped hands into a "bin" of hops. He also records the case of a girl of 14 years of age who, while suffering from chilblains, plunged her hands into a "bin" of hops to warm them and then developed a rash similar to the one he had suffered from himself. O'Donovan,[2] in 1924, again drew attention to the condition, and recorded two cases which he saw at the London Hospital. He points out that they follow

the general type reaction as described by Sequeira in cases of dermatitis caused by plants. He states that "females only, so far, have been affected from the ages of 12 up to 67, and always in the month of September." Lewith[3] notes the occurrence of three cases, all females.

In a letter to THE LANCET in October, 1924, after reading O'Donovan's article, Streich[4] describes a case of hop rash in a woman of 40 who, in addition to the rash on her hands and face, which was typical in appearance, also developed a purpuric rash on her legs. A further reference to the condition was made about the same time by Galbraith,[5] who says that "Dr. Ebden, in charge of the Hop Pickers' Hospital and Dispensaries at Marden, noted 58 cases of hop rash." Galbraith also states his belief that this hop rash, together with the conjunctivitis and synovitis noted, is produced by some irritant from the hop plant. In support of this belief he says that "owing to the remarkable absence of vermin from the hops in the present year (i.e. 1924), no washes have been used." This discountenances any theory there may be that the affections under consideration are due to the chemical washes used on the plants. This is further supported by the fact that no regular garden employee applying washes to the hops during their period of growth has been known to suffer from the rash, conjunctivitis, or gout.

The next reference to the subject is found in a brief note in the Annual Report for Kent for 1926, as reported in THE LANCET,[6] in which of 25,000 pickers it is said that 237 suffered from hop rash, 95 from hop eye, and 87 from hop gout. It is thus evident that the affections are fairly common among the pickers.

My own attention was first drawn to the subject when acting as medical officer to the Hop Pickers' Hospital and Dispensaries at Marden in 1927, when a number of cases were seen and treated. In 1928, when acting in the same capacity, I made careful notes of all cases seen throughout the hop-picking season of August and September, and out of a total of 1172 cases of all kinds 52 were of hop dermatitis. Of these, 4 were men, 39 were women, and 9 were children of both sexes under 14 years of age. The incidence of cases among males is of interest in face of the fact that all recorded cases have hitherto been females.

The 52 cases mentioned made a total of 81 attendances at the hospital for treatment, thus indicating the short duration of the disease. It appears to recur in the same individual year after year. One or two adults remembered suffering from it as children and had thereby been deterred from hopping, but they had ventured again thinking that they might have outgrown their susceptibility. This was not so. One boy of 12 years of age had suffered from it severely on each of his two visits to the hop gardens, and was not anxious to return the following year, in spite of the alluring prospect camp life in the country must offer to the East-end child.

The onset of the disease is marked by a papular erythema occurring on exposed surfaces; hands, arms, face, in one or all of these situations. The accompanying irritation is intense, and it is usually this which drives the patient to seek medical advice. Concomitant with this is usually some general constitutional disturbance which may be severe. In the worst cases the patient complains of headache and irresistible drowsiness. One case which came to the hospital almost fell asleep as she described her symptoms, and it was only by making a considerable effort that she was able to concentrate sufficiently on her tale to make herself clear. In this case headache was a prominent feature. The face and hands were covered with a dense papular erythema, and there was considerable œdema of the parts, so much so that the woman could scarcely see out of her eyes, and was unable to clench her fists.

The papular stage may rapidly become vesicular and then pustular, the pustules varying in size from about one-tenth of an inch to half an inch in diameter. Associated with the dermatitis are invariably a number of small scratches from the hop bines. Pickers' hands are always deeply stained a dark green colour, and have the characteristic smell of hops about them. The colour is no doubt due to a conglomeration of hop washes, hop juices, and hop pollen. The presence of innumerable scratches, together with an inevitable inoculation of them with hop juices and pollen, suggests some kind of protein sensitisation.

Hop Eye.

Hop eye has received much less attention than hop rash. It was first discussed by Adams,[7] who made an exhaustive examination of the hop plant, and came to the conclusion that hop eye is due to a mechanical irritation of the eye by the spine-shaped hairs found on the top bracts, leaves, and bines. The condition is also recognised by Prosser White,[8] and is mentioned by Galbraith,[5] and the Kent Annual Report, 1926.[6]

At the Marden Hop Pickers' Hospital in the 1928 season, 14 cases of hop eye occurred among the total of 1172 patients treated. Of these, 11 were women and 3 were children. No cases were noted among men. The condition in a previously healthy eye is a conjunctivitis. There is considerable lacrymation, and usually there is œdema of the eyelids associated with it. Hop eye comes on rapidly after the eye or eyes have been rubbed with fingers dirty from hop-picking. The patient comes complaining of pain in the eye, smarting in character, which rapidly becomes worse. On examination the conjunctiva is uniformly reddened and lacrymation is marked. The amount of accompanying œdema of the lids varies considerably. In one case a woman came running in from the hop garden with a "swollen eye." She was positive that the swelling came up within a few moments of having rubbed the eye with her fingers. Her fingers were covered with the usual dark green stain from the hops. The conjunctiva of the eye was perfectly clear and there was no lacrymation. The lids were both swollen so much that the patient was unable to open them herself.

As in hop dermatitis, the association between a receptive body surface and a possible source of protein irritation is striking. The similarity between these conditions and those produced experimentally on a much smaller scale by the cutaneous and ophthalmic reactions used in the estimation of individual susceptibility to such proteins as those, for example, which are known to produce hay-fever, is arresting and merits further investigation.

Hop Gout.

The only references to hop gout are made by Prosser White[8] and Galbraith.[5] It is recognised by hop pickers and growers as a condition peculiar to the hop-picking season. Like the dermatitis and conjunctivitis it is never seen at other times of the year among workers in the hop gardens.

At the Marden Hospital in the 1928 season, of the 1172 cases seen only 17 were treated for hop gout. Although 50 per cent. of all cases were children, not one of them was found to be suffering from hop gout. Women appeared to be more frequently affected than men, for of the above 17 cases 11 were women varying from 20 to 70 years of age, and the remaining 6 were men of from 29 to 58 years of age. It should be pointed out that in all three of these conditions the prevalence among women is probably due in part, if not entirely, to the fact that the number of women employed is very much greater than the number of men. The patient suffering from hop gout comes complaining of pain, limitation of movement, and swelling of fairly rapid onset. It may occur in the fingers, hand, wrist, or forearm, and is unilateral. The swelling is red and tense, and on palpation a typical fine crepitation is felt like the crunching of crisp snow. In most cases the condition runs as short a course as the allied rash and conjunctivitis.

The following are notes of a typical case:—

A man of 29 years came complaining that he could not use the first and second fingers of his right hand, and of a painful swelling on the back of the hand. He had started work

on the previous day feeling quite fit as usual. In the afternoon he had noticed that the first finger was "getting tired." It then began to feel numb, so that he had to stop picking and rub it till sensation was restored. After the tea interval the back of the hand had begun to ache, but no swelling was noticeable. He rubbed some liniment into the hand that night and slept soundly. The next morning he found, while dressing, that he could not pick things up easily, and kept dropping them. The back of the hand then appeared to be red and a little swollen. He tried to work in the hop garden that morning, but found that he could only use the hand for short spells at a time. After half an hour's picking a quarter of an hour's rest was necessary to restore the feeling in the hand.

On examination a red tense swelling was seen on the dorsum of the right hand. On palpation it appeared to be very tender. No fluctuation was felt and there was no pitting on pressure. On passive movement of the first finger fine crepitations could readily be felt in the swelling especially along the line of the first metacarpal bone, and similarly on passive movement of the second finger crepitations were felt along the proximal third of the corresponding metacarpal bone. None was felt on movement of the third and fourth fingers. Measurements were made of the swollen parts and comparison made with the sound hand. The patient was not subject to any digestive disturbances, and no trace of a gouty diathesis was apparent.

Whether one is justified in associating this synovitis with the dermatitis and conjunctivitis described remains to be seen. The ætiology of all three of them is as yet obscure, and it is to be proved whether the origin of one or all of them can justly be attributed to a protein sensitisation.

References.

1. Badham, J.: Exanthema and Narcotism from the External Application of Hops, Lond. Med. Gazette, Oct. 25th, 1834.
2. O'Donovan, W. J.: THE LANCET, 1924, ii., 597.
3. Lewith, R.: Arch. f. Derm. u. Syph., 1928, cliv., 239.
4. Streich, C. J.: THE LANCET, 1924, ii., 727.
5. Galbraith, S. N.: Ibid., p. 885.
6. See THE LANCET, 1927, i., 582.
7. Adams, P. T.: Brit. Med. Jour., 1893, i., 1000.
8. White, R. Prosser: Occupational Affections of the Skin, 3rd ed., p. 436, H. K. Lewis, 1928.
9. Ibid.

Clinical and Laboratory Notes.

SPONTANEOUS REDUCTION IN VOLVULUS OF THE BOWEL.

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IT is generally believed that volvulus is sometimes reduced spontaneously, but direct evidence is difficult to obtain, for once reduction has occurred there is usually no occasion for either operation or post-mortem examination. The following cases are of interest, in that they provide evidence of reduction having occurred.

CASE 1.—A Mohammedan agricultural labourer, aged 50, was admitted to the King George V. Hospital, Lucknow, with a much distended abdomen, occasional vomiting, and periodic attacks of griping pain. He said that in the last four years he had had three similar attacks which had passed off after a day or two. This attack was more severe, and had lasted four days, during which he had passed neither fæces nor flatus. Enemata produced no result, and at operation a volvulus of the sigmoid was found. The affected loop was enormously distended, and its walls were hypertrophied. It was easily untwisted and at once emptied into the rectum. It was then noted that besides a few soft recent adhesions there were old firm adhesions at the pedicle of the volvulus binding the two ends of the loop together, and a patch of old scarring on the bowel, evidently the result of a previous attack. The ends of the loop were separated so far as possible, and fixed, in the hope of preventing a recurrence. The patient recovered.

The next two cases concern the small intestine, and it is necessary here to refer to the frequency of volvulus of the small intestine in India. I have met with it in 6 out of 25 operations, and in 2 out of 4 postmortems.

CASE 2.—A Hindu male, aged about 40, was admitted to the Thomason Hospital, Agra, on the third day of obstruction. He gave a history of a similar attack about two years previously. The general condition was grave.

At operation the cæcum and lower ileum were empty, and on tracing the empty bowel upwards it was found that a few inches above the ileocæcal valve it was firmly adherent to the root of the mesentery. Above this point were some feet of normal but empty bowel. The bowel was then again adherent to the root of the mesentery; from this point upwards it was distended.

The arrangement of the bowel and mesentery was exactly like that of a volvulus; the mesentery was gathered up like a pedicle between the points of adhesion to the bowel. But the intervening loop was empty instead of distended, as in volvulus, no twist was really present, and further examination showed that the obstruction was due to a stricture, the result of extensive scarring of the bowel. Obviously there had once been a volvulus which had undergone spontaneous reduction after causing grave damage to the intestine.

The third case is an example of a type very common in India, in which what appears to be grave obstruction is relieved by a succession of enemata, leaving the surgeon wondering what was the nature of the obstruction. But this patient died soon after the relief of the obstruction, and furnished a most interesting post-mortem.

CASE 3.—A Nepalese road labourer, aged about 30, was admitted to the Crossthwaite Hospital, Nainital, with distension, vomiting, and pain. The onset, 12 hours previously, had been sudden, and the patient showed some degree of collapse. He had already taken a purgative. He refused operation, and two enemata failed to relieve him. An hour later, after a third enema, he passed a copious watery motion, but became so collapsed that an intravenous infusion was called for. Twenty minutes later a further action occurred and all distension disappeared, but he died a few minutes later.

A post-mortem examination was made within two hours. The only abnormalities found were the following. There were subserous hæmorrhages in the ileum, most marked at the antimesenteric border, and increasing in intensity as the bowel was traced downwards to a point about 4 inches from the ileocæcal valve, where they ceased abruptly. There was also a contusion on the left face of the mesentery at this level, in the form of an oblique streak near its root. There was no thrombosis in the mesenteric vessels. The lower limit of the subperitoneal hæmorrhages corresponded with the usual lower limit of a volvulus of the small intestine, and I have noted identical bruising in one post-mortem and in one operation in cases of volvulus, the bruise being simply the impress of the tense lower end of the loop.

It is impossible to explain these findings, except on the basis of a volvulus which had undergone spontaneous reduction.

EPIDEMIC (LETHARGIC) ENCEPHALITIS IN A VERY YOUNG INFANT.

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CASES of encephalitis lethargica in very young infants are of rare occurrence, although instances of infected mothers passing on the disease to their offspring have been recorded. The youngest of this type contracted the disease when two weeks old, as described by W. Harris[1] and subsequently further discussed in the Ministry of Health report.[2] Sporadic cases of the disease in early infancy have been described. Neal[3] in a collection of 274 instances of the disease finding four under the age of three months. Happ and Mason[4] recorded a case of encephalitis lethargica in a black baby at the age of five weeks, and Findlay and Shiskin[5] described a non-fatal case of an infant which became drowsy at three weeks of age, with a left internal squint. The following case is put on record because of its exceptional nature, in that symptoms appeared at the end of the second week of life, although there is no evidence that the mother was the source of infection.

A. B. was the first child, born at full term of healthy parents. The mother was in excellent health throughout pregnancy, and neither then nor at any other time had

suffered from any symptoms which could be attributed to encephalitis lethargica. The labour was normal and light chloroform anæsthesia was induced during the last hour. The baby was not at all cyanosed at birth and for the first 14 days of life remained perfectly healthy. At the age of one week circumcision was performed under light ether anæsthesia, and the subsequent progress was excellent for a week. At no time was the child in contact with any patient suffering from any of the symptoms of encephalitis lethargica. Vaccination was not performed.

At the age of 14 days it was noticed that the child was irritable. Then drowsiness set in and it became increasingly difficult to rouse the child, who was admitted to the Hospital for Sick Children at the age of one month. The bowels had been acting normally, there had been no vomiting, no head retraction, and no convulsions.

On admission the baby lay in a very drowsy state, from which it could not be roused even for feeding. No cry could be elicited by any form of stimulation. The left side of the face was paralysed, and there was some slight rigidity of the limbs. The knee-jerks were active and the plantar responses flexor. The pupils were contracted and did not react to light. Ophthalmoscopic examination revealed normal discs. The fontanelle was depressed, the temperature was normal, and the pulse-rate was 130 per minute. No abnormalities could be found in the other organs or systems. The urine was normal and the blood-urea was 42 mg. per 100 c.cm. A superficial nævus about two inches in diameter was present behind the left ear. The respirations ceased on several occasions before death, but artificial respiration was effective in restoring the normal respiratory rhythm until two days after admission, when death occurred. The cerebro-spinal fluid was not examined.

Section of optic thalamus. (× 100.)

The *post-mortem examination*, 20 hours after death, showed no naked eye abnormalities of any organ. The brain was more congested than normal, but there was no special localisation of this congestion in any part of the brain. No sign of any nævoid condition of the vessels of the meninges or brain was present. Portions of the cerebral cortex and basal ganglia were submitted to histological examination. In the optic thalamus definite evidence of the presence of encephalitis of the "lethargica" type was obtained (see figure). The perivascular lymphatic spaces were full of small round cells giving the classical appearance of "cuffing," while there is also a more diffuse but less well-marked infiltration of the brain-tissue between the blood-vessels. Other regions of the brain examined appeared normal.

I am indebted to Dr. Hugh Thursfield for permission to publish this case, and to Prof. J. McIntosh and Dr. J. G. Greenfield for kindly examining the histological sections of the brain.

References.

1. Harris, W.: THE LANCET, 1918, i. 568.
2. Reports on Public Health and Medical Subjects, No. 11, 1922. Ministry of Health, p. 33.
3. Neal, J. B.: Jour. Amer. Med. Assoc., 1921, lxxvii., 121.
4. Happ, W. M., and Mason, U. R.: Bull. Johns Hopkins Hosp., 1921., xxxii., 137.
5. Findlay, L., and Shiskin, C.: Glasg. Med. Jour., 1921, xcv., 18

CONTINUOUS ARTIFICIAL RESPIRATION,

WITH MAINTENANCE OF THE CIRCULATION FOR TWELVE HOURS AFTER APPARENT DEATH.

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Many cases have been reported in which patients who have collapsed during, or shortly after, operation and apparently died, have been resuscitated, and their life maintained for varying periods; yet I consider the following case exceptional enough to be reported.

History of the Case.

A married man, aged 51 years, a railway clerk, was admitted to the David Lewis Northern Hospital, Liverpool (case No. 1894/29), suffering from trigeminal neuralgia. Seven years previously he had had a right lower molar tooth removed on account of a root abscess. Shortly after the extraction the neuralgia started, and at first involved the whole of the right side of the face. Three years later a sequestrum was removed from the site of the previous trouble in the lower jaw, and after this the neuralgia was confined to the right inferior maxillary nerve. The nerve had been injected with alcohol on three occasions with definite, but only temporary, relief. The relief from pain after the third injection lasted only a few weeks.

As life, especially in cold weather, had become unbearable owing to the frequency and severity of the attacks of neuralgia, it was decided to cut the sensory root of the right Gasserian ganglion. On July 13th, 1929, under rectal ether anæsthesia, the ganglion was approached through a subtemporal trephine opening one inch in diameter, and its two maxillary divisions and its sensory root were clearly defined. While the ganglion was being shown to the students the overlying brain suddenly bulged, forcing the brain retractor down on to the base of the skull. It was immediately obvious that an intradural or cerebral hæmorrhage had occurred, and all thought of cutting the sensory root of the nerve was abandoned, and instead, a hook-shaped knife was quickly passed round the inferior maxillary nerve between the ganglion and the foramen ovale, and in this way the nerve was cut.

The dura was now bulging through the trephine hole, and all cerebral pulsation had stopped. The opening in the skull was enlarged with bone forceps and the dura was opened. No blood escaped, but the brain was pushed out and lacerated on the edge of the skull opening, so great was the intracranial pressure. The opening in the skull was still further enlarged, and as some pulsation could now be seen, and as the general condition of the patient did not warrant further interference, the wound was quickly sewn up. The patient returned to the ward at 12.40 P.M., and at that time he was breathing regularly, and the pulse did not give any cause for alarm.

At 1.0 P.M., shortly after the rectum had been washed out to remove the ether, the patient collapsed and stopped breathing. The house surgeon was called to the ward, and found the heart beating very feebly; he started artificial respiration, but at 1.40 as there was no sign of active respiration restarting, and as the heart beat could no longer be felt or auscultated, he ceased his efforts and came to report that the patient had "died."

I saw the patient about 1.50 P.M.; he was then apparently dead. The eyes were dilated and fixed, all the muscles flaccid and the reflexes absent, respiration had stopped and there was no indication that the heart was beating. We decided, however, to make a last effort, and restarted artificial respiration. After a few minutes the pulse began to return and steadily increased in volume, but there was no other sign of life. By 2.15 the heart was beating rapidly (140), but so strongly that there was marked intercostal and epigastric pulsation. All attempts to restart active respiration were in vain, and by 3.30 P.M. the heart had again become weak and the pulse impalpable.

An intracardiac injection of 1 c.cm. of 1-1000 adrenalin was given and within a few minutes the heart was once more beating strongly. After about twenty minutes the force of the heart beat once more began to fade, but a second injection of adrenalin again restored its force, so that, even through the bed-clothes, it was possible to see the præcordial and epigastric pulsation.

And so it continued, the pulsation of the heart the only sign of life. Intracardiac injections of adrenalin were given every 15–20 minutes; after each injection the heart beat strongly for ten or more minutes, and then gradually faded away, only to come back promptly after another injection. At 6.0 P.M. the wound was examined; little or no blood had drained out, but the whole area bulged markedly, so the

skin stiches were removed. At this moment an injection of adrenalin was given, and immediately there was a burst of hæmorrhage from some of the skin vessels, and artery forceps had to be applied and the vessels ligated. Slight pulsation of the brain was noted. The dressings were replaced.

At 8.0 P.M. the pulse-rate was 140, and in the brachial artery the systolic pressure was 125 and the diastolic pressure 75 mm. of Hg. At 8.45, immediately after the 18th injection of adrenalin, the pulse-rate was 148 and the systolic and diastolic pressures 135 and 80. Though the effect of the injections was still phenomenal it was now noted that the pulse-rate was steadily increasing, and the effect of each injection was not as lasting as the earlier ones had been. Yet even then, if, when the patient was quite pulseless, an intracardiac injection of 1 c.cm. of adrenalin was given, within a minute the heart would be beating so strongly that pulsation could be easily seen in the epigastric region and in the vessels in the neck.

Artificial respiration and the injections of adrenalin were continued until midnight when the 27th and last injection was given. The heart continued to beat feebly until 1.30 A.M. Artificial respiration was then stopped. Except for the ten minutes between 1.40 and 1.50 P.M., artificial respiration was maintained continuously for twelve and a half hours, during which time the patient showed no sign of life other than the pulsation of the heart.

Post-mortem Examination.

We were unable to obtain permission for a full post-mortem, but we examined the lungs, heart, and brain.

The *lungs* were normal. The *heart* was also normal, except for an area of ecchymosis extending from the surface almost through into the heart cavity. This area was about the size of a sixpence, and was situated on the anterior wall of the right ventricle, and had been produced by the numerous intracardiac injections.

Head.—Except for the opening made to decompress the brain there was no opening or puncture in the dura. No hæmorrhage was found on the right side of the brain. There was considerable diffuse subdural hæmorrhage on the left side of the cerebrum and on the front of the pons and medulla. The left lateral ventricle was filled with blood, but there was no hæmorrhage in the brain substance.

Very careful examination of the operation field showed that at no place had the dura been opened, nor was there any hæmorrhage either within or without the dura. The inferior maxillary division of the trigeminal nerve had been cut through close to its origin from the Gasserian ganglion, but otherwise the nerve was intact. There was no bony covering to the carotid canal, but neither the carotid artery nor the superior longitudinal sinus was injured. The cavernous sinus was intact. The right superior cerebellar artery appeared to be severed, but there was no clue as to how this had happened, and I am of the opinion that it was injured in removing the brain.

It is very unsatisfactory that no explanation was found to account for the sudden, dramatic, and fatal hæmorrhage. Exactly the same technique was used in this case as in all our previous cases of section of the sensory root of the Gasserian ganglion, none of which had given rise to any trouble or anxiety.

Lieut.-Colonel C. T. Samman, J.P., R.A.M.C., was recently re-elected Master of the Society of Apothecaries of London for the ensuing year.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION.—An all-day course in diseases of the chest will be held at the Brompton Hospital from Sept. 9th to 14th. From Sept. 9th to 22nd, under the direction of Dr. Eric Pritchard, a course will be given at the Infants Hospital designed for those engaged in infant welfare work. A course of lecture-demonstrations in psychological medicine will be undertaken by Dr. Porter Phillips and members of his staff at the Bethlem Hospital, on Tuesday and Saturday mornings at 11 A.M., from Sept. 10th to Oct. 5th. An intensive course of medicine, surgery, and the specialties (for men only) will be held at the Westminster Hospital from Sept. 16th to 28th, daily, from 10.30 A.M. to 5.30 P.M. The Prince of Wales's General Hospital, in conjunction with the North Middlesex Hospital, Tottenham, will give a course in gastro-enterology from Sept. 30th to Oct. 4th. Another evening course for the first M.R.C.P. will be held from Oct. 15th to Dec. 6th, on Tuesday and Friday evenings, at 8.30 P.M. in the lecture hall of the Medical Society of London. Full particulars of the above and other courses may be had from the Secretary of the Fellowship at 1, Wimpole-street, London, W.1.

BRITISH MEDICAL ASSOCIATION.

ANNUAL MEETING IN MANCHESTER.

(*Continued from p. 479.*)

SECTION OF MEDICINE.

PATHOGENESIS AND TREATMENT OF ASTHMA.

Dr. A. F. HURST (New Lodge Clinic) remarked that this was the sixth occasion on which asthma had come up for discussion at an annual meeting, and while he doubted whether any real advance in knowledge had been made, yet he believed the disease was better understood now than heretofore. An appreciation of the variations, within the limits of the normal, of the chemical constituents of the body fluids afforded a basis upon which inherited constitutional tendencies might be explained. The pathogenesis of asthma lay in slight deviations from average blood chemistry whereby vagal overaction was favoured as against the opposing sympathetic effects. Thus arose muscular bronchial spasm and mucous secretion producing the classical changes. Suprarenal exhaustion, he thought, played no insignificant part, as shown by the increased liability to asthma as the result of fatigue, which partially explained week-end, menstrual, and pre-holiday attacks. The part played by adrenalin was demonstrated by the low blood-sugar content, the low blood pressure, and the effect of adrenalin treatment. The hypersensitiveness made familiar by the cutaneous reactions had led to little result except for the help given by proteins in children and pollens at all ages. The nose was important from the point of view of restricted air inlet; a distended stomach or rectum might be the source of an attack. The psychological factor of expectation was potent.

Of the many forms of treatment only two approached a cure—namely: (1) Careful dietary as applied more particularly by Dr. Adam to children, and (2) residence in the Alps at a height of 4000 ft. or more. The effect of the latter was due more to atmospheric rarefaction than to freedom from dust and allergens. Nasal hygiene involved three factors: (*a*) Removal of sepsis from the sinuses; (*b*) securing a free airway; (*c*) destroying the asthma-reflex area. Biochemistry seemed to offer some prospect of cure, but this aspect had not yet been fully developed. A cheery optimism did much to help the psychological factor in many patients; reflex exciting causes, especially from stomach and rectum, always needed careful attention. The treatment of the paroxysm remained, and for this adrenalin was a specific. The principle of giving the patient instructions and a hypodermic syringe was maintained and the method of continuous adrenalin administration in status asthmaticus was described. Ephedrine had proved more useful in mild hay-fevers than in real asthma.

Dr. JAMES ADAM (Glasgow) reported his experience in the treatment of 1100 cases of asthma over a period of 30 years. He believed that their origin was: (1) toxic, (2) dependent to a large extent on nasal conditions. The toxic effect was due to combined absorption of nitrogenous poisons from the gut and to error in nitrogenous metabolism. Excessive carbohydrates in the diet were often the determinant. Over-feeding and under-exercise were the chief factors in week-end attacks. The periodicity of nocturnal, weekly, and menstrual attacks all indicated a metabolic origin. The eczema and urticaria commonly associated with asthma were due to the same cause and amenable to the same treatment. A large number of cases occurring before the sixteenth year could be cured if mouth-breathing was corrected. Oriel's work was referred to as supporting the theory of nitrogenous metabolic errors. The disappearance of eosinophilia along with the asthma in acute pyrexias was due to increased adrenal activity, which was also the basis of success in the cold bath or cold douche treatment. The frequency of a family history in asthma was attributed by the speaker to identity of environment rather than to inheritance of defect.

Prof. R. J. S. McDOWALL (London) showed how asthma could be induced by: (1) Local irritation, as by inhaling irritant gases; (2) chemical stimulation, as by injecting bodies of the histamine group; (3) nervous stimulation, as shown by Brodie and Dixon, and reflex from stimulation of the nose; (4) psychic stimuli via the vagus, on the same basis as salivation at the prospect of food. The part played by the vagus in asthma was further indicated by the associated vagal phenomena of increased bronchial secretion and occasional colitis. Week-end and digestion asthma, the low blood pressure, slow pulse, low blood-sugar curve, and eosinophilia were all, possibly or probably, vagal in origin. The two asthma camps, championing nasal defects or allergy, were both concerned with vagal activity, and he reported some recent experiments of his own, which showed that a foreign protein (peptone) injected into the circulation enormously enhanced the capacity of pilocarpine to stimulate the vagus. Hess had for years stated that asthmatics were abnormally sensitive to pilocarpine, and it was known that foreign proteins increased the amino-acid content of the blood as well as causing a temporary constriction of the bronchioles. In this way the widely varying causes and cures of asthma fitted into a more or less intelligible physiological picture.

Dr. G. H. ORIEL made the following points: Asthmatics do not all belong to one type. In asthma associated with eczema, migraine, and urticaria the van den Bergh reaction is often positive, the amino-acid is high, urates are deposited in the urine, and the blood-sugar may be low. In uncomplicated asthma the van den Bergh reaction is usually negative; the amino-acid may be high, but the blood-sugar and pressure are low, pointing to under-action of the sympathetic. A complex nitrogenous substance may be extracted from the urine during paroxysms, and this gives positive skin reactions with the patient from whom it is extracted. This substance is probably specific. In the first biochemical type treatment should be directed to the gut and liver; Adam's detoxicating treatment has proved beneficial, especially with the addition of glucose to the diet, as suggested by Osman, along with spirits of ammonia in one drachm doses, especially in children. In the second type treatment, in addition to attacking the diathesis, should be directed to stimulating the sympathetic by thyroid.

In the ensuing discussion Dr. WATSON-WILLIAMS reiterated his belief that asthma arises from a nasal reflex, while Dr. F. T. HARRINGTON emphasised the factor of nasal sepsis and the need for general detoxication, while training in diaphragmatic breathing was important. Dr. WHARRY was also a believer in nasal sepsis as a cause, but thought some method of reducing the general sensitivity of the nervous system was requisite in many cases. Dr. CAMPS recorded his experience of the inhalation of adrenalin vaporised by an oxygen stream, and claimed this as a simple and safe method which patients could easily manage for themselves.

SECTION OF SURGERY.

PAPILLOMA OF THE BLADDER.

Mr. J. B. MACALPINE (Manchester), who opened the discussion, defined a papilloma as a tumour made up of hypertrophied papillæ. Two problems invited brief preliminary discussion: (1) Do all papillomata, if left to themselves, eventually undergo malignant transformation? Many surgeons, he said, regarded all papillomata of the bladder as premalignant tumours, an attitude which produced the necessary solicitude in their treatment. (2) How shall the nature of the growth be decided? Pathological diagnosis was extremely uncertain; in the experience of many surgeons recurrence might follow the removal of tumours regarded as simple, and vice versa. Mr. Macalpine said he had come to rely solely on cystoscopic data for his diagnosis of these growths; those he judged to be simple he treated with perurethral diathermy, and those which he suspected of being carcinomatous by open operation. The longer and more delicate the villi the more benign the growth. When surface necrosis appeared malignancy was indicated. In the less benign varieties the layers of epithelium were more numerous and the tumour coarser and paler. The appearance of the pedicle was important; a thin flexible and long pedicle occurred with benign papilloma; a stiff, stumpy one indicated malignancy. The type of papilloma that was sessile over a wide area had a very unfavourable outlook. If such had been treated by diathermy some inflammatory swelling might remain closely resembling true neoplastic infiltration; regarding diagnosis, repeated cystoscopy was the only way of excluding this "pseudo-carcinoma." In about one-third of all patients papillomata were multiple, with a tendency to return, and the prognosis after operation was not so good.

In deciding on treatment perurethral diathermy was unanimously agreed to be most suitable for simple papillomata and open operation for malignant growths. When there was doubt as to the nature of the tumour, and diathermy was not plainly succeeding, open operation should be undertaken without delay. In some patients cystoscopy was impossible owing to the extent of the growth and the accompanying cystitis or hæmorrhage. In these cases valuable information might be obtained by filling the bladder with a radiographically opaque solution, when X ray examination might demonstrate the outline of any growth present. In this series six cases occurred in workers in aniline dye, which was almost certainly an exciting cause. Prior to the onset of the neoplasm in these workers there had been a premonitory period in which the patient suffered from symptoms of cystitis with occasional hæmaturia. Dr. T. H. Wignall had drawn attention to the long period of contact necessary, 20 to 30 years being the average.

Mr. Macalpine outlined his method of treatment, stating that bipolar diathermy was generally used in this country for small benign papillomata. At the end of about two to three weeks benign papillomata should be definitely smaller and have separated, their appearance simulating granulation tissue. If slough still adhered to the growth malignancy must be suspected. If the growth was malignant excision offered the only hope, and in order to remove the lymphatics which ran in the deep layers a generous area of bladder wall must be removed after mobilisation of the bladder, the operation wound being protected by swabs soaked in silver nitrate (1 in 1000). He concluded by remarking that cases of symptomless hæmaturia should be submitted to immediate cystoscopy.

Mr. HENRY WADE (Edinburgh) urged the importance of immediate cystoscopy for all cases of symptomless hæmaturia, and stated that the mucous membrane adjoining the stem of the papilloma should be observed, as at times there was a roughened area round the base of the papilloma from which fresh tumour tissue might grow, hence it was important to destroy this. He regarded perurethral diathermy as the method of choice for the treatment of the majority of cases of papilloma, and thought the growth should be destroyed at one sitting under a general anæsthetic, warning the patient that a secondary hæmorrhage might occur later when the slough separated, which latter might with advantage be removed in order to obviate the possibility of stone formation. He regarded the following cases as suitable for open operation: (1) Growths of the size of a walnut or larger. (2) Growths situated round the vesical orifice. (3) Cases in which there was a tumour with vesical spasm in persons aged 50 and over. Spasm suggested infiltration. (4) Cases with accompanying disease, such as enlarged prostate, where there was fear of infection. In malignant infiltration the growths were found to be more sessile, the villi were fused, and the surface irregular; for these open operation should be performed. If the growth could

be picked up when the bladder was opened then he did a mucous resection of the growth. If the growth was fixed (it was important to make sure that the growth did not arise from, e.g., the bowel) partial cystectomy was the operation of choice. In these cases, if the ureteric orifice was involved, the speaker left the divided ureter just in contact with the sutured bladder when communication was re-established by natural processes. Complete cystectomy must be done in stages; first cystotomy to confirm diagnosis, then operation for disposing of the ureters either externally or preferably, into the bowel, and finally the bladder was dealt with.

Mr. SWIFT JOLY (London) described treatment and its results in cases with no malignant infiltration; he included cases with thickened epithelium as he did not regard these as malignant. If the tumour was superficial the correct treatment was perurethral diathermy, but if there was even slight infiltration he opened the bladder and did either wide resection or open diathermy, inserting radium round the scar. Before 1913 all cases of papilloma of the bladder were treated by open operation, and he gave an account of 30 cases of single papilloma thus treated with four recurrences, and nine cases of multiple papilloma which recurred, all being fatal. Of 25 cases of single papilloma treated by perurethral diathermy six recurred more than five years afterwards. Multiple growths were common, but with perurethral diathermy good results might be ultimately expected with care and patience. If there was recurrence after open operation for papilloma, the patient was in a worse condition than before, for the secondary growths were often multiple and sessile. Mr. Joly described his retrograde cystoscope, including its uses for growths near the internal meatus and on the anterior wall of the bladder; he used continuous irrigation in the diathermy of extensive growths. For growths in the posterior urethra and in the internal meatus he used a posterior urethroscope.

Mr. R. J. WILLAN (Newcastle-on-Tyne) said that of 68 cases under his care 53 were males and 15 females; their age varied from 23 to 77. In distinguishing between simple and malignant papilloma he thought the best help was obtained from examination of the pedicle, although pathological diagnosis was often fallacious. Of the 26 fatal cases of his own the following were the causes of death: 6, general dissemination; 6, cachexia; 2, local extension into rectum and vagina; 2, hæmorrhage; 1, surgical kidney; 1, heart failure; 1, post-operative shock; 7, cause unknown.

Prof. ANDREW FULLERTON (Belfast) described his technique of cystectomy, which is to cut the ureters above the bladder, not preserving their orifices (as some do), and stressing the importance of drainage by means of a rigid tube passing through the levator ani muscle and the ischio-rectal fossa.

Mr. H. H. RAYNER (Manchester) gave an account of two cases of extensive carcinoma of the bladder, both apparently cured after suprapubic cystotomy and insertion of radium.

Short Papers.

Dr. A. T. BAZIN (Montreal) gave an account of paraffinoma of the rectum simulating carcinoma in a case which was referred to him and which previously had prolapsed piles treated by a course of paraffin injections. The interest of this case lay in the differential diagnosis from carcinoma and in the treatment, which consisted in excision of the affected bowel, the ends being joined up with preservation of the sphincter. In the ensuing discussion Mr. J. P. Kilner condemned the use of paraffin injections, mentioning a case of extensive epithelioma of the skin after injections of the chest.

Prof. DEAN LEWIS (Baltimore) gave an account of congenital arteriovenous fistulæ which presented a very different problem from the treatment of the acquired condition resulting from injuries. The former, by reason of the large number of anastomotic communications, at times baffled treatment.

SECTION OF OBSTETRICS.

SURGICAL TENDENCIES OF MODERN OBSTETRICS.

Prof. E. ESSEN-MÖLLER (Lund, Sweden) said the art and science of midwifery was developing in a manner as important as it was interesting. Physiological research was investigating the biology of pregnancy in normal and pathological conditions. X rays, pelvic measurements, examinations of urine were being applied to detect anomalies and apply prophylactic treatment to lessen the risks to mother and child. And now surgical interference was increasingly taking the place of the older obstetrical methods. In placenta prævia the only resource used to be tamponade until version could be performed. In eclampsia venesection and chloroform were the only means of avoiding new fits. Prophylactic treatment was well-nigh unheard of. The merits of the old midwifery must, however, not be disregarded. The most important advance dated from the revival of the classical Cæsarean section and the invention of the vaginal section; by the latter means it was possible to empty the uterus at any period of pregnancy or labour. The risk or value of an operation ought not to be estimated solely on the primary results, infection, embolism, and the like. The secondary risks were just as important, as, for example, the risk of thinning or rupture of the scar after Cæsarean section, and fear in subsequent pregnancies. Prof. Möller quoted Hirsch, of Berlin, who advocated surgical interference in normal labours in order to avoid examination and risk of infection, alleging that this was the only way of diminishing maternal mortality. He did not agree with Hirsch, although he admitted that owing to the rush for more speed Cæsarean section was now being abused. Labour, he said, was a physiological process in which there should be no interference without due caution and consideration.

Prof. A. DONALD (Manchester) said he represented the old school; there had been, he thought, more innovations and greater advances in midwifery than in gynæcology. When he was a house surgeon at St. Mary's Hospital the visiting surgeons took little interest in midwifery, most of which was conducted in the patients' houses. Maternal mortality was low then probably because they used antiseptic methods rather than aseptic. The introduction of pituitrin into obstetric practice had brought with it dangers of its own. The greatest advance of all had been in the provision of careful antenatal supervision.

Prof. R. J. JOHNSTONE (Belfast) said his maxim was avoid interference. Operation was now so safe that it required more courage to refrain than to operate. He did not think it practicable to carry out aseptic midwifery in the patients' houses, and he always taught his students to use antiseptics.

Prof. R. W. JOHNSTONE (Edinburgh) thought that Prof. Möller's paper should have been entitled "operative" rather than "surgical" tendencies, as surgical technique, especially the use of antiseptics, was always adopted in obstetrics. He agreed with those who advised antisepsis in domiciliary treatment. The Edinburgh school did not favour vaginal hysterotomy for emptying the uterine contents, as they had not had satisfactory results. He referred to abdominal hysterotomy for cases of hydatidiform mole and pernicious vomiting of pregnancy.

Dr. B. SOLOMONS (Dublin) said that a person practising gynæcology could not be a specialist in obstetrics. By patience and observation in labour many operative procedures could be avoided.

Prof. MÖLLER, in reply, said the possibility of Cæsarean section was a great asset to the elderly primigravida, with a breech presentation, where the life of the child was a little uncertain if delivered through the natural passages; he advocated great caution before resorting to it as a routine method. In Sweden, apart from versions and forceps, operative treatment was carried out in a hospital or nursing home.

THE GYNÆCOLOGIST'S TRAINING.

Prof. T. S. CULLEN (Baltimore) said that every surgeon, if he was to get the most out of his work,

must have had a thorough grounding in general pathology and in the surgical pathology of the particular subject which was to become his life-work. He outlined the system adopted at the Johns Hopkins Hospital. Each year five men from the graduating class were assigned to the gynæcological department, during which year they had charge of patients, took histories, and assisted at operations. At the end of the year one of these was selected for promotion; he then became an assistant to the professor of pathology for the next year, when he had ample opportunity to make autopsies, gain knowledge of gross pathology, and familiarise himself with anatomy. He then returned to the gynæcological department, examined and described the material coming from operations, with time to devote to the investigation of gynæcological problems. The fourth year he was made first assistant and for the final year resident gynæcologist in full charge of the department, when in addition to assisting the visiting surgeons, ample opportunity was afforded for doing both major and minor operations. Every gynæcologist should be able to treat any abdominal emergency, and he gave a large series of cases he had encountered where such knowledge was essential.

Dr. J. W. RIDDEL (Plymouth) said that for those who intended to adopt gynæcology and obstetrics as a specialty, and were not fortunate enough to be attached to teaching hospitals, it might still be possible to gain the necessary surgical experience whilst carrying on general practice, where the necessary breadth of mind was also acquired.

Prof. R. J. JOHNSTONE agreed that the gynæcologist should be ready to deal with all emergencies; other lesions were often met with when the diagnosis of a pelvic lesion had been made. All gynæcologists should, he thought, do a year's demonstrating in the anatomy department and also be obstetricians.

Prof. J. P. MAXWELL (Pekin) said he had been both an obstetrician and a gynæcologist: it was only a gynæcologist with clinical experience who could estimate the value and give an opinion on curettings.

Dr. A. E. GILES (London) thought anyone going in for gynæcology should have a broad preliminary training in obstetrics and gynæcology, specialism to come later. He considered diagnosis and experience more important than actual knowledge of abdominal surgery as most operative procedures were similar, and a surgeon accustomed to a certain surgical technique could easily follow others.

PROPHYLACTIC TREATMENT OF ALBUMINURIA.

Dr. L. C. RIVETT (London) dealt with the prophylactic treatment of cases which had had albuminuria in a previous pregnancy. The publications of Young and Gibberd had, he said, stimulated this attempt to guard against permanent renal damage. The essential feature of the treatment was to maintain the urine throughout the whole of subsequent pregnancies at a minimum alkalinity of pH 7·7. In order to achieve this, large doses of alkali were given by mouth. To guard against over-dosage it was advisable to estimate the bicarbonate content of the blood plasma at repeated intervals, especially if any change of the original dose was indicated. The normal plasma content in pregnancy was 0·030 molar concentration. In 85 per cent. of women, however, there was a considerable reduction, the average being 0·0247. The dose found to be safe and effective was usually about 400 grains a day of equal parts of sodium bicarbonate and potassium citrate, but this should be varied according to the reaction of the urine. In some up to 780 grains had to be given, whilst in others it might be reduced to 1–2 drachms. Especial attention should be paid to the bowels, diet, and hygiene, while strenuous exercise was to be avoided. Dr. Rivett gave the clinical histories of a series of 14 cases submitted to the treatment.

Dr. J. YOUNG (Edinburgh) thought the treatment described held out hope for these cases and would probably throw light on the ætiology of the albuminuria of pregnancy. He did not agree that a great many of these cases sustained permanent renal damage as estimated by kidney function tests; he found it only occurred in about 8 per cent. There was evidence of recurrence in about 50 per cent. of the cases who subsequently became pregnant, and in these the tendency to permanent renal damage was greater.

Dr. A. CROOK (Norwich) had used alkalis in many cases of albuminuria with good results. Some cases known to him as chronic nephritic with high blood pressure had shown no albuminuria when they subsequently became pregnant, although there was a tendency to abortion.

Dr. H. L. GREER (Belfast) said he had given alkalis to pregnant women for heartburn and had noticed that they were more comfortable in the latter part of pregnancy. The incidence of eclampsia was diminished in cases treated with alkalis.

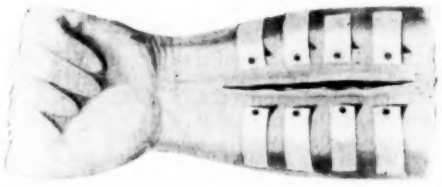
Dr. F. LACEY (Manchester) said he had been regularly examining urines antenatally, and had found a large number containing the colon bacillus. In his experience pyelitis was a common condition.

New Inventions.

SURFACE SUTURES.

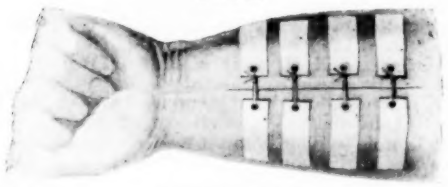
I HAVE devised what may be described as surface sutures ("Surfasutes") for approximating the cut edges of wounds without stitching. They are intended to largely do away with the necessity for using clips, or a needle to suture lacerated wounds. The device consists of strips of specially adhesive plaster cut in various shapes and sizes, each furnished with small smooth eyelets. As shown in Fig. 1 after the

FIG. 1.



laceration has been cleaned, sterilised, and dried, they are laid in interrupted position on each side of the wound, the eyelets being about half an inch distant from the cut edge. A sterile, half-curved needle, threaded with silk, or silkworm gut, is then passed through the eyelets instead of the skin and the edges of the wound can be accurately approximated as shown in Fig. 2. There are many obvious

FIG. 2.



advantages: sterile surface sutures, needle and silk, or silkworm gut, can be carried in the doctor's bag and are always ready for immediate use; the pain of stitching is entirely done away with; no stitch scars are left; there is no danger of stitch abscesses; dressings can be changed without disturbing the surface sutures; the plaster strips are antiseptic and specially adhesive, and therefore cannot slip; and the smooth surface of the eyelets is in contact with the skin and therefore there is no chafing. The eyelets can be raised for the ready introduction of the sutures because the adhesive surface does not run beyond them, but is enfolded to strengthen their insertion. Messrs. A. de St. Dalmas and Co., Ltd., Leicester, are the manufacturers.

HENRY DE P. B. VEALE, M.R.C.S. Eng.

Rebiews and Notices of Books.

OTO-RHINO-LARYNGOLOGY.

The Nose, Throat, and Ear and their Diseases. In original contributions by American and European authors. Edited by CHEVALIER JACKSON, M.D., Sc.D., LL.D., F.A.C.S., Professor of Bronchoscopy in the University of Pennsylvania; and GEORGE MORRISON COATES, A.B., M.D., F.A.C.S., Professor of Otology, University of Pennsylvania Graduate School of Medicine. London and Philadelphia: W. B. Saunders Company. 1929. Pp. 1177. 60*s.*

THIS important work is one of those written by a very large number of experts in various departments of their specialty. It retains a predominantly transatlantic outlook, for of the 76 contributors, only five are European, three hailing from Great Britain and two from France. Each section is written by one who has interested himself specially in the subject discussed, and the whole is edited by men of such eminence in laryngology and otology that its appearance is an event of some importance. Since the book is full of valuable detailed information, contributed by acknowledged experts, it seems ungrateful to criticise defects inherent in any work of this type; but some of them could doubtless have been mitigated by a vigilant editorial survey before publication. There is considerable overlapping and unevenness in the treatment of different subjects, and some of the descriptions are disappointingly terse for a book of this size. For example, the section on tonsillectomy teaches that "before proceeding to the removal of the other tonsil it is essential that all bleeding should have been completely arrested," and that "arterial or venous hæmorrhage of any moment should be arrested by ligation." A method of ligation is shown in Fig. 179, but although several ingenious devices are in general use among laryngologists for this purpose there is no description of any method in the text. No account of the treatment of cancer of the larynx and pharynx by radium and deep Rontgen ray therapy, which has lately made considerable progress, is included in the book, and the methods of operation included under lateral pharyngotomy are not set out in sufficient detail. As an instance of the difficulty of adjustment of material under multiple authorship, we note that intubation is described very clearly and at length early in the book under the treatment of diphtheria, and tracheotomy towards the end, after laryngectomy. The important question whether intubation or tracheotomy is the best method of coping with obstruction in diphtheria is dismissed in the earlier section with the words: "Laryngeal diphtheria may require intubation on tracheotomy; the operation of choice is usually intubation." We prefer the advice offered later in the book: "If the case is one of diphtheria and there is a skilled intubator who will not only introduce the intubation tube but will remain in the house to reintubate in case the tube is expelled, intubation is worth consideration; otherwise it is not." The book is well produced, and the editors are to be congratulated on the general plan adopted. Most of the illustrations are excellent, a bibliography concludes each section, and, most important in a work of this scope, the index is full and adequate.

SURGICAL INFECTIONS AND INFLAMMATIONS.

Trattato generale e speciale delle infezioni o infiammazioni chirurgiche. Vol. I. By DEMETRIO B. RONCALI, Director of the Royal Institute of Surgical Pathology at the University of Naples. Naples: Stabilmento Tipografico I.N.A.G. 1929. Pp. 336. L.65.

THIS volume is devoted to general infective or inflammatory processes; a successor will treat of acute and subacute processes such as tetanus, erysipelas, gas gangrene, and suppuration in general, and a third volume with chronic diseases such as syphilis, actinomycosis, epithelioma, and tuberculosis. The preface contains the astounding statement that "clinical medicine persists in asserting with no uncertain voice, and without requiring the permission of any Imperial or Royal Institute, or national or international commission for the study and treatment of cancer, that all malignant neoplasms having a beginning, course, and result identical with those of the majority of processes of parasitic origin cannot logically be otherwise than infections or inflammations, *sui generis*." A second no less astounding statement is found in the historical survey which precedes the classification of surgical inflammations—viz., that Harvey was not the discoverer of the circulation of the blood, but that following on the observation of the non-permeability of the cardiac septum and consequent perception of the pulmonary circulation by Realdo Colombo, the real discovery of the general circulation was to be attributed two years afterwards to Andrea Cesalpino.

The leading idea of this work seems to be that all surgical inflammations are really infections and due to parasitic action which engages in a struggle for life (1) at the site of infection, (2) in the parenchymatous organs, and (3) in the torrent of the sanguineous and lymphatic circulation. Such being the main conception much space is given to recording the views of numerous observers—the index of these authors contains considerably more than 500 names. The work shows considerable erudition, but it may be doubted whether any real advance in surgical pathology is made in its pages. Dr. Roncali's conclusions seem to be that the struggle for mastery at the site of infection takes place between the host, with its histiogenic and hematogenic cells and its antibodies, and the parasite with its bacterial cells and antigens. That this struggle may end in the victory either of the host, resulting in cure, or of the parasite when organisms invade the blood, is no new conception in pathology and this is the main thesis here developed.

THE CLIMACTERIC.

The Critical Age. By GREGORIO MARANON, Professor of Medical Pathology in the Madrid General Hospital; Member of the Royal National Academy of Medicine. Translated by K. S. STEVENS. Edited by CAREY CULBERTSON, A.B., M.D., F.A.C.S., Associated Clinical Professor of Obstetrics and Gynæcology, Rush Medical College of the University of Chicago. London: Henry Kimpton; The C. V. Mosby Company, St. Louis, U.S.A. 1929. Pp. 425. 18*s.*

THIS is an English translation, revised by the author in 1925 from the second edition of Prof. Maranon's well-known work, originally published in Spain in 1918. It is curious that an event of such obvious importance in the life of women as the climacteric has received so little scientific attention in the past. A full account of almost any rare disease would be easier to find in medical literature than a discussion of the clinical aspects and physiopathology of the climacteric. Prof. Maranon points out that the climacteric is not merely a syndrome of genital insufficiency, as was thought until recently, but is the pathological consequence of a complex and constant endocrine crisis like that of puberty, the glandular elements of which can be made out with some degree of accuracy. This greater knowledge of the mechanism of the crisis enables us to interpret clearly and to treat correctly many phenomena which were previously obscure. The classic concept of the climacteric as a simple genital incident disappears. In its place appears the more comprehensive concept of the "critical age," that of a long period of life in either sex the nucleus of which is the genital disturbance, but in the development of which all organic activities participate. The author's comprehensive outlook is well illustrated by a review of some of the chapter headings of the present volume. He first describes the ovarian, thyroid, suprarenal and hypo-

physial factors, and gives an account of the rôle of the vegetative nervous system in the symptomatology. There are other chapters on the psychological problems of this period, the psychic, genital, metabolic, and endocrine symptoms. Finally, a full account is given of the artificial or surgical climacteric, and every aspect of treatment is considered. The book is conceived from the point of view of the general practitioner, but will also be of considerable interest to gynæcologists.

NEUROLOGY.

Revision de la doctrine des localisations cérébrales. By Dr. R. BRUGIA, Professor in the University of Boulogne. With a preface by Prof. PIERRE MARIE. Paris: Masson et Cie. 1929. Pp. 190. Fr.24.

WE are always a little dubious of iconoclastic revisions, especially where they concern any body of doctrine built up on the laboriously collected evidence of generations. It is a priori unlikely that in these modern times such evidence should be based on mistaken ideas throughout, or that had it been built up on insecure foundations this would not have been recognised long since. Prof. Brugia invites us to believe that there is no such thing as a nervous "centre"; that psychical, speech, inhibitory, and sensorimotor "centres" are unreal; that no collections of ganglionic cells effect some "magical" action; and that their place is taken by "zones in which spinal or cerebral receptoric activity precipitates itself, without transformation, in terms of movements." Spinal and cerebral "reflexes" indicate the free passage (more or less direct, more or less rapid) to the organs of expression, of activities derived from the mechanisms of sensibility. It may be so. But after all, what is meant by a "centre," and what by "localisation"? What is the difference between a "centre"—misleading word—and a "zone"? And what of the accumulated clinicopathological data in respect, say, of the visual cortex? What of Jacksonian epilepsy? If there is no specificity as regards neural cerebral mechanisms, nothing but a non-specific "electro-colloidal change," why should any sufferer remain blind, deaf, halt, or aphasic as a consequence of cerebral lesions? Unfortunately, we have ample clinical evidence that compensation and substitution are not prominent characters of cortical function.

Neurological Examination. By CHARLES A. MCKENDREE, A.B., M.D., Associate Physician, Neurological Institute of New York. London and Philadelphia: W. B. Saunders Company. 1929. Illustrated. Pp. 280. 15*s.*

THERE are many small handbooks for the tyro in neurology to slip in his pocket and refer to at the bedside or in the out-patient clinique, until such time as his acquaintance with neurological method becomes second nature and book aid superfluous. This newcomer is welcome for its clarity and completeness. Probably none has ever been written in which the expert has not found something to criticise and something to amend, and Dr. McKendree's is no exception. But it serves its purpose well.

Text-book of Clinical Neurology. For Students and Practitioners. By M. NEUSTAEDTER, M.D., Ph.D., Visiting Neurologist, Central Neurological Hospital, Welfare Island. Philadelphia: F. A. Davis Company. 1929. Pp. 602. $6.

Dr. Neustaedter covers the field of clinical neurology in compendious fashion, his working arrangement being mainly semiological. Under the headings Spastic Paralyses, Flaccid Paralyses, Ataxias, Trophic Disorders, and so forth, he manages to include a great deal of useful knowledge, described in precise terms and amplified by a liberal supply of illustrations. The method, doubtless, has its merits, but its disadvantages are no less apparent. The thalamic syndrome is raked in under spastic paralyses, amyotrophic lateral sclerosis under flaccid paralyses, Charcot-Marie-Tooth amyotrophy under diseases of the cranial nerves (itself a subdivision of flaccid paralyses), facial neuralgia under tremors and spasms. Such classifications are highly unsatisfactory, but after all tabulation is of minor importance. We have noted but few errors or misleading statements. It is scarcely accurate to say in a case of Bell's palsy that if taste is abolished on the anterior two-thirds of the tongue "we are dealing with a middle ear affection." Rod-cells are not, as a matter of fact, "pathognomonic of paresis." Why the "functional neuroses" should be limited to hysteria and neurasthenia is not clear. The clinical descriptions embody the most modern investigations and deserve high praise.

MENTAL DEFICIENCY (AMENTIA).

Fifth edition. By A. F. TREDGOLD, M.D. Durh., F.R.C.P. Lond., F.R.S. Edin., Lecturer on Mental Deficiency, London University. London: Baillière, Tindall and Cox. 1929. Pp. 535. 25*s.*

THIS valuable standard work has now attained its majority, the first edition having appeared in 1908. Since that time great changes and developments have occurred in this field. The importance of mental deficiency as a national handicap and disgrace is becoming more and more fully recognised; its causes, manifestations, and incidence are being studied by an increasing number of gifted and devoted workers, and the efforts which have been initiated to combat it are rapidly gathering momentum. Dr. Tredgold's book has developed with the times, and represents a thoroughly up-to-date survey of the position as it is to-day. Since August, 1922, when the fourth edition appeared, two important events have occurred: the alterations in the legal definitions made by the Act of 1927, and the publication by the Joint Committee of Dr. E. O. Lewis's report on the number and condition of defectives in this country. The treatment of this material has meant a complete revision of the book, and, although the general plan remains the same, many chapters have been much altered, and some have been entirely rewritten. Several illustrations have been added. Dr. Lewis's figures indicated that the number of defectives in England and Wales in 1927 was approximately 314,000, or 8 per 1000 of the population. This represents an apparent increase of no less than 100 per cent. on the figures of the Royal Commission of 1904. Dr. Tredgold's analysis of this striking difference deserves close attention, since the question of whether the incidence of mental defect has really doubled or whether the increase can be accounted for in other ways is very important. He concludes that, although it is not conceivable that the number of defectives has actually doubled, there has nevertheless been a relative and an absolute increase in mental deficiency in the last 20 years. This growth in the severity of the problem, with the corresponding growth in public concern, render even more vital the necessity for well-informed leadership of the kind represented in this book.

THALLIUM ACETATE TREATMENT OF RINGWORM.

Le traitement des teignes par l'acétate de thallium. By Prof. J. G. URUEÑA, Clin. Dermat. Med., Faculty of Mexico. Paris: Masson et Cie. 1928. Pp. 144. Fr.18.

THE author's reasons for devoting a book to a subject on which the bibliography threatens to become voluminous are that European writers are apt to ignore the initial impetus given to it by Mexican workers, that many authorities are inclined to condemn a method which is fraught with certain risks, and that it appeared advisable to concentrate all that is known of the subject in an accessible and readable form. Prof. Urueña and his Mexican

confrères, Cicero, Salvador, Peter, and others certainly deserve credit for having brought the method into the realm of practical therapeutics, but it must not be forgotten that without the pioneer work of Buschke, who first determined the dosage, and whose investigations were carried on for a period of over 20 years, thallium acetate treatment would still be under the strictures imposed on it by Sabouraud in 1913 (Les Entretiens Dermatologiques). The subject is considered in six main sections. Chemical and experimental aspects are first dealt with; a report follows on animal autopsies, well illustrated by photomicrographs, and the remaining sections are devoted to the biological, therapeutic, and toxic reactions in the human subject. It is claimed that a dose of from 5–8 mg. per kilo body-weight is non-toxic for children between the ages of 2 and 12 years. A dose of more than 8 mg. per kilo should not be exceeded although experiments on the guinea-pig and rabbit demonstrated that fatalities do not occur until a dose of 14 mg. per kilo is reached. A second dose, in cases of failure to epilate should not be given when the first produced toxic symptoms, and only after a considerable interval (three months according to general opinion). The value of thallium acetate in the treatment of tinea tonsurans is undoubted, but it is an indisputable fact that the drug attacks healthy hairs in preference to the infected. Prof. Urueña would have earned more appreciation if he had devoted a section to the after-treatment, which is laborious and cannot be left to subordinates; without it failure to cure is almost inevitable. Although much has been written in this country on the subject, not a single British writer finds a place in the bibliography.

PUBLIC HEALTH.

Collected Studies from the Bureau of Laboratories of the Department of Health of the City of New York. Vol. X. Covering years 1920-1926. New York: Department of Health. Pp. 583.

DIPHTHERIA ranks with pneumonia and diarrhœa as a highly prevalent and fatal malady among children of all classes and races in New York. This volume of collected papers from the Department of Health of the City of New York contains, among other matters, reprints of many weighty contributions to the literature of prophylaxis. Dr. William H. Park and Dr. Abraham Zingher are the chief authors, the former being one of the pioneers of therapeutic measures against diphtheria on modern lines over 30 years ago. Most of the papers were first published in 1925, but the facts they contain will bear reiteration.

Taken as a whole they comprise a plea for the educational propaganda necessary to enable mass immunisation of the children of a community against diphtheria to be carried out. And the fact that the weapon for this mass immunisation is now in our hands is eloquently expounded. The first consideration is the Schick test. Provided the technique is correct and reagents are accurately arranged—desiderata often notably lacking—the Schick test appears to be almost infallible. After the age of 2 a negative Schick test indicates complete and lasting security from diphtheria. Indeed, so emphatic are certain authors in this belief that they contend that a patient who has recently shown a negative Schick test and who, nevertheless, presents a faucitis, with diphtheria bacilli recoverable from the lesion, can be classed as a carrier who has by chance developed a sore throat. In other words, a child who has shown a negative Schick test will not suffer from diphtheritic toxæmia. One of the papers contains an analysis of 150,000 Schick tests. By this immense survey the liability to diphtheria was shown to be anything from 60 per cent. to 80 per cent. of all children, the lower figure being given by the returns from schools in less salubrious districts. As a guide to the need of giving immunity by toxin-antitoxin injections the Schick test has its limitations. It is not significant under six months, because at that age a child almost always has a fair amount of naturally inherited immunity. In the age-period of 6 to 24 months the Schick test, though infallible as a guide to the state of immunity or otherwise at the time it is done, is not an accurate guide to the desirability or otherwise of toxin-antitoxin injections because in this age-period the natural immunity is waning and changing. From 2 years to 5 years is the period of greatest susceptibility to the disease. The patient's natural immunity having now become stabilised, the Schick test can be used as a guide to the need of therapeutic immunisation. In later childhood the same remarks apply.

In the reports of therapeutic immunisation an enormous mass of data is presented. They should therefore be studied in the original by all engaged in public health. Therapeutic immunisation consists of three injections of a suitable toxin-antitoxin mixture at weekly intervals to children who are shown by the Schick test to be susceptible to diphtheria. In about 85 per cent. of all children so treated immunity will develop in less than six months, and it will last at least six years. Unfortunately for the children, but fortunately for the purposes of statistical survey, the workers were denied the facilities for therapeutic immunisation in 90,000 susceptible children. These served as controls against another group of 90,000 children whose parents consented. The value of therapeutic immunisation was shown by the overwhelming preponderance of morbidity and mortality in the unprotected group.

LES PHÉNOMÈNES DE RÉPERCUSSIVITÉ.

By Dr. ANDRÉ THOMAS, Physician to the Saint Joseph Hospital, Paris. Paris: Masson et Cie. 1929. Pp. 246. Frs. 32.

IN his introduction, Dr. André Thomas seeks to provide the reader with a definition of "repercussion" or "repercussivity" and with a general exposition of his point of view. When in the bodily organism a given organ is affected it reacts on other healthy mechanisms—this is known as "sympathy," or sympathetic action. But when the physiological activity of other viscera reacts on the affected organ, the phenomena are considered to be different, and the suggestion is that the process should be distinguished as one of "repercussion," and the condition, "repercussivity." For example, the pilomotor reflex can be elicited in the normal subject by simple cutaneous excitation—for the upper limb, by excitation in cervical or axillary regions. Now if the arm has been wounded, with evident skin cicatrisation (peripheral nerves need not have been involved) the reflex appears more rapidly, is of greater intensity, and lasts longer on the affected than on the healthy limb. In other words, a change has taken place whereby the local or regional susceptibility of the skin has increased, and this is regarded as an instance of repercussivity. The abnormal reacts to the normal in an exaggerated way; the resistance of the pilomotor mechanism to stimulation has been reduced, the threshold lowered. Dr. Thomas then proceeds to apply this discovery to a number of differing conditions in which a given part of the organism is already affected, taking for a further example sudoral activity. He finds that in the vicinity of wounds (say in arm or neighbouring region of thorax), homolateral hyperidrosis occurs with some regularity, and he notes the same in respect of vasomotor repercussivity. Proceeding in an ingenious if rather speculative fashion, he next argues that some of the symptoms of the epilepsies can be explained on the supposition that stimuli otherwise inert or minimal produce their effect precisely because of an increased susceptibility—that is, repercussivity—the result of some existing abnormality; similar reasoning is applied to those of migraine, asthma and angina pectoris.

On the whole, this book provides stimulating reading, unwise though it may be to generalise hastily from the relatively restricted basis of observed facts.

THE LANCET.

LONDON: SATURDAY, SEPTEMBER 7, 1929

VITAL STATISTICS OF 1928.

THE first of the three parts, in which the annual vital statistics of this country are now presented by the Registrar-General, contains a wealth of detailed information of which only the salient features emerge on cursory perusal. Much interest attaches to the growth and changes in the age-constitution of the population of England and Wales, and, although not contained in the volume at present under review, this information is already available, and its direct bearing on questions of morbidity and mortality makes it essential to emphasise certain fundamental points. The population of this country, the estimated total of which for 1928 is 39,482,000 persons, has of recent years been undergoing changes in composition which profoundly influence the total annual quota of deaths. The declining birth-and death-rates have resulted in a diminution in the proportion of infants and young children, and a corresponding rise in that of persons in the later life. For instance, the figures contained in the last two censuses show that in 1911 the population aged 0-5 years, and 55 years and over, formed respectively 10·7 and 11·6 per cent. of the total, whereas within the succeeding decennium the proportion of young children had fallen to 8·8, and the 55-years-and-over group had increased to 13·7 per cent. For 1928 the corresponding figures work out at 8·1 and 15·8 respectively. Obviously, the effect of such a change on crude mortality-rates will be unfavourable because of the larger proportion of persons now living at ages subject naturally to heavy rates of mortality, and this emphasises the need for some method of "standardisation" when long-time secular changes in the death-rate are under consideration. The total deaths registered in the past year (460,389) correspond to a crude rate of 11·7 per 1000 population, compared with 12·3 in 1927. With two exceptions this is the lowest rate ever recorded. When the influence of the changes in age distribution is eliminated (as far as can be done by a statistical process) the "standardised" death-rate is reduced to 9·9 per 1000 living, the lowest ever recorded since the beginning of registration. Compared with the previous year, 1928 must therefore be regarded on the whole as exceptionally healthy, the improvement being however practically confined to childhood and ages over 45 years.

Analysis of the separate causes of death shows that the chief contributors, in descending order of importance, are: disease of the heart and circulation, which recently have shown a tendency to increase, respiratory diseases (all forms) from which, possibly owing to the mildness of the winter, mortality in 1928 was abnormally low, malignant disease, diseases of the nervous system, and tuberculosis. The relative frequency of the several important cause-groups is substantially similar to that of the previous year. The deaths registered from tuberculosis, both respiratory and other forms (29,799 and 6824 respectively) are in each case the most favourable returns since the end of the war, which marked the commencement of what since then has been an almost uninterrupted decline. Deaths from cancer again show an increase, the total number, 56,253, being equivalent to a rate of 1425 per million persons living. The distribution of mortality by site affected shows a fairly close correspondence with that shown in the statistics of immediately preceding years. Although relatively unimportant causes of mortality, diabetes and, this year more particularly pernicious anæmia, possess for the clinician a special interest. Mortality from diabetes shows an increase over that recorded in the previous year, but here, as in other years since the introduction of treatment by insulin, the increase is confined to the later ages of life. The introduction during 1927 of liver treatment for pernicious anæmia has coincided with a reduction in the number of deaths from 2655 in 1927 to 2139 in 1928, the crude annual death-rates per million for each of the years of the triennium 1926-8 being 71, 68, and 47 respectively. More careful analysis is obviously required before causal connexion is established between the introduction of a new therapeutic remedy and an improvement in mortality, but the figures at least must be regarded as exceptionally encouraging. Among epidemic infectious diseases, we note in 1928 the continued though slightly diminished prevalence of small-pox, an increase in the incidence of scarlet fever, diphtheria, and erysipelas, a decline in the number of deaths from whooping-cough and influenza (the recent epidemic was just beginning towards the end of the year), and in the notifications of acute poliomyelitis and encephalitis lethargica.

The number of children born in 1928 was 660,267, an increase of some 6000 births over the previous year. This is, apart from 1927, the lowest birth-rate on record. The decline in fertility has its influence on the risk of death to infant and mother. A falling birth-rate is generally associated with an increasing proportion of first births and a decreasing frequency of infants born into large-sized families. Recent statistics have shown how great is the loss of life in these large families compared with that experienced in small families, and although first-born infants fare slightly worse in respect of mortality than do second or third-born, their chance of living through the dangers of the first year of life is, on the average, bright compared with that of infants born into families of more than three. Thus the declining birth-rate leads to a parity distribution of infants increasingly favourable to a low recorded rate of mortality. How much of the improvement in the loss of infant life which has taken place since the beginning of the present century may be due to this circumstance and how much to intentional efforts of control, to which it is more generally attributed, has not yet been thoroughly investigated. Maternal mortality has an opposite tendency. The increasing proportion of first-births with its attendant enhanced dangers to the mother (more especially in certain diseases such as eclampsia) may offer a partial explanation at least of the lack of amelioration in this mortality-rate. The deaths of infants under one year of age show a decline from 70 per 1000 births in the preceding year, to 65 in 1928, the major part of the improvement being attributable to the fall in bronchitis and pneumonia. We note also the continued high level of deaths from injury at birth and congenital malformations; and that, in general, the decline is in the main in the latter half of the first year of life. The inclusion of a table showing for the

[1] The Registrar-General's Statistical Review of England and Wales for the Year 1928. Tables: Part I. Medical. H.M. Stationery Office. 15*s*.

separate sanitary areas the number of stillbirths by sex and legitimacy—the only difference in substance and form of presentation of this from previous reports—offers to workers in the field of maternity and child welfare data of a most valuable nature. County boroughs and other urban districts show, in the aggregate, the highest rates, rural districts occupy an intermediate position, and London has the most favourable experience. Geographically, the order in respect of antenatal mortality of the separate areas is, from highest to lowest: Wales, Northern Counties, Midlands and South (including London). Males experience a stillbirth mortality 16 per cent. in excess of female, and illegitimate show a rate 40 per cent. in excess of legitimate infants. The need for careful study of the factors which operate to produce such wide divergencies is obvious. The record of mortality among child-bearing women offers little scope for optimism; indeed the experience of the year under review is the worst on record since 1911. There were 2920 maternal deaths (a rate of 4·42 per 1000 live births) compared with 2690 in 1927, the increase being found chiefly in the three cause groups, accidents of childbirth, puerperal sepsis, and puerperal albuminuria and convulsions. Although, as we have seen, there are certain changes occurring in the reproductive section of the female population tending towards an increase in the death-rate, we might reasonably have hoped for better results, and are forced to admit how urgent is the need for further efforts towards a diminution in a section of mortality generally considered to be pre-eminently avoidable.

The value of these reports to research and public health workers generally has often been stressed, but too few of them, we fear, yet avail themselves of the manifold opportunities for research into the pressing problems of the day which these admirable collections of data offer.

THE COMPLICATIONS OF VACCINIA.

A SERIES of cases of encephalitis following vaccination which, although few in number, are by their nature distressing, have stimulated the interest and concern of both the public and the medical profession. That vaccination is a procedure of necessity, attended by sequelæ which, in rare instances, are severe or even fatal, has never been denied; the study of the clinical aspects of vaccinia by T. D. ACLAND in Allbutt and Rolleston's System of Medicine, remains the classical presentation of the case. The medical profession as a body, and the educated public to a large degree, have always preserved a sense of proportion, and have weighed in the balance the exceptional disadvantages and the universal advantages. While this remains true to-day, it is yet highly essential that questions of technique, both in the process of vaccination and in the preparation of the lymph, should be reviewed in the light of accumulated experience. A virus originally procured from a lesion in a cow may, to-day, be propagated in a number of different ways, such as by passage through rabbits, and by culture in association with tissues. These modifications are not the technique of JENNER; and our knowledge of "filter-passing viruses" is still so rudimentary that a strict watch must be kept for any evidence of change of type or virulence. Until recently, the gravest dangers of vaccination have been regarded as those of sepsis, common to all skin lesions, and largely avoidable. We have, however, to visualise to-day the possibility—for it is certainly no more—of lesions in organs other than the skin, and in particular, in the central nervous system.

Material is too scanty as yet for legitimately dogmatic inferences in the human subject. But, in the work of Prof. J. C. G. LEDINGHAM and DR. MARY BARRATT, published on p. 515 of our present issue, we have definite evidence that, in the rabbit, two strains of the vaccinia virus, when applied by scarification of the skin, led to death with visceral involvement in certain cases. It has in the past been suggested that such deaths are due to excitation of a latent infection with a practically universal bacillus of the food-poisoning group—a bacillus which frequently decimates animal houses. The work of Prof. LEDINGHAM and his colleague completely disproves this assumption on histological and bacteriological grounds. Lesions of the type described may be produced in rabbits either by the intravenous injection of the normal cutaneous virus, which is in everyday use in the human subject (though never injected intravenously) or by scarification of the skin by certain modified viruses which, in this country, are not in use. And, as the authors point out, this work clearly shows that they must not be used. It is to be noted that encephalitis was not a feature in any of the affected rabbits, which suffered rather from generalised vaccinia. Such generalisation is a rare occurrence, usually not fatal, in man, and is not associated with encephalitis. The strains of vaccinia virus available are very numerous. Originally they were propagated by serial scarification of calves, or by using the material from one human case to infect another. Early in the present century rabbits were used as intermediates between one calf and another. Still more recently LEVADITI prepared his neurovaccinial virus by injecting the skin virus into the brain of rabbits. He claimed thereby to have "fixed" the virus, so as to make it affect the brains of subsequent rabbits; this has not been confirmed. But his neurovaccinial virus has been propagated in the testes of rabbits and used extensively in Spain on human cases without, apparently, any disadvantages following; as noted in this paper, it is stated to have led to encephalitis in Holland when similarly used.

There seems to be no evidence whatever that any additional encephalitic virus has been picked up from rabbits, which never suffer from this type of encephalitis spontaneously. But propagation in the brain and testes of rabbits is shown to alter the virus, not in the direction of the production of encephalitis, but in the direction of dissemination of the virus, rather than localisation in the skin when applied by scarification. The immediate bearing of this work on post-vaccinial encephalitis is not, therefore, direct. It is clearly proven that there is a choice of material, and that some material is to be discarded. It is suggested that a modification in the properties of vaccine lymph may be induced by the technical methods employed. That is a great advance. It should be more simple, in the future, to carry this process of analysis further, and to determine whether any grounds at all exist for the belief that the vaccinia virus may be modified so as to lead, however rarely, to encephalitis. The practical aspects of this question should not however blind us to the important theoretical issues involved. Few problems of infection have remained so obstinately elusive as that of the "filter-passer"—a name quite inappropriate to the virus of vaccinia at any rate. Its study in tissue culture, and by propagation in the rabbits' testes, open new avenues. Its modification with modified technique may throw new light on its properties. And every new fact ascertained with regard to it serves as a guide to analogous investigations into the nature of other diseases of analogous origin. Perhaps, in the widest interest of humanity,

it is this aspect of the study of vaccinia which we should welcome, rather than the light it throws on the clinical accident known as post-vaccinial encephalitis.

OPEN-AIR BATHING FACILITIES.

THE return of the heat-wave brought a reminder of the disabilities suffered by Londoners who have few opportunities to get rid of their surplus heat in semitropical weather. The sufferers will gladly learn of the plans in the mind of the new Commissioner of Works. Mr. LANSBURY is providing seats in Trafalgar-square and a playing space for children around the Albert Memorial in Hyde Park. He proposes further outdoor shelter for children in Bushey Park and is opening to the public the Cambridge enclosure at the Admiralty Arch. In all the public parks the policy is to be carried out of taking down the railings where they are not required to protect natural beauties. But all this leaves untouched the great desire of all children and most healthy adults to bathe in the open air during a hot spell of weather, and not only to bathe but to have the opportunity of sitting about in undress both before and after the dip; and the proposal to make the Serpentine available for this purpose will be welcomed. Holiday visitors to the continent this year must have been struck by the prodigious increase in the facilities for open-air bathing provided wherever a lake or a bathing pool of any size is available. The capital outlay is small and the running cost is covered by the modest fee paid by the throngs of people of all ages who find refreshment and vigour from bathing in a judicious mixture of sun, air, and water. At the present time the Serpentine is of little, if any, use to women bathers since no provision has been made for dressing and undressing. Their need may be the less urgent since one of the most striking features of the emancipation of women in all civilised countries is the comparative freedom with which her clothing transmits air and sunshine; there has been no effective corresponding movement to secure similar skin culture for the male population. But happily the problem of providing open-air swimming facilities need no longer be complicated by sex differentiation. Honest fears of the harmful effects of mixed bathing have long been set aside by experience, and there is now no possible excuse for refusing the facilities on any such grounds. Indeed, it is refreshing to see how the newer generation accepts, without thought of evil, behaviour that those of maturer years once feared as threatening inviolable principles. A little healthy humiliation may result to the elders from the comments and puzzled questioning of young people on hearing descriptions of ladies in voluminous garments, emerging from discreetly hooded bathing machines and bobbing in the shallow water as they clung to the end of a rope, whilst in a remote part, to which none of them would dare approach, the males carried out more daring feats; for not only the garments but the other restrictions of those days made women swimmers rare among those whose visits to the seaside were an annual event. By insistence upon sex these elaborate taboos, with their opportunities for more or less indecent jest and allusion, cultivated, or perhaps indicated, the Peeping Tom state of mind. If we apply the standard of "evil to him who evil thinks" we must congratulate the present generation, for in the less populous seaside places anyone once familiar with the old régime must be impressed by the way young people of both sexes, in the absence of formal rules, regulate their undressing and dressing without offence and without self-consciousness. The healthy human figure is beautiful, and the student of human nature may wonder how it came to be associated with those taboos from which we are now freeing ourselves with benefit to health and happiness and with no detriment to our morals. If he lives long enough he may learn, for the history of fashion either in clothes and habits of thought gives little support to the idea that the sensible conventions now adopted will remain stationary. They will inevitably change—whether in the direction of what we would now call greater licence or in that of greater prudery. In either case we do not anticipate that any obstacles will be placed in the way of mixed bathing in our time. The plans of the Commissioner of Works accord with the trend of the times, and it is to be hoped that they will take some practical form before the summer comes to an end.

Annotations.

"Ne quid nimis."

THE INTERNATIONAL CONGRESS OF OPHTHALMOLOGY.

THE Ophthalmological Congress which was opened by the Queen Mother of Holland at Amsterdam on Thursday afternoon resumes the long series of international gatherings which have twice been broken by wars in Europe since the first meeting at Brussels in 1857, when the ophthalmoscope was newly discovered and pioneers like von Graefe and Donders gave the fruits of their experience. The fourth meeting appointed for 1871 in Berlin was prevented by the Franco-German War, and the twelfth planned to take place at Petrograd in 1914 was not held, although the communications prepared for it were circulated to members. The present Congress is guided by the rules and by-laws drawn up by a committee under the chairmanship of Mr. Treacher Collins which met in conference at Scheveningen in 1927. Papers printed beforehand include reports on visual standards, standardisation of perimetry, of visual acuity, of the notation of the meridians of astigmatism, and on the light-sense test, on uniformity in the programme of teaching ophthalmology for medical students and future ophthalmologists, and on unification of the standards for airmen, motor drivers, railwaymen, and sailors. A directory has been brought out of all practising ophthalmic surgeons in the world, of all ophthalmological societies, institutes, hospitals, and asylums for the blind, and of ophthalmic journals. This alone makes a volume of over 350 pages, of great value for reference purposes. The list of papers to be read at the present Congress includes 232 items, each of which is abstracted in five languages—English, French, German, Italian, and Spanish. The programme obviously covers a wide range of subjects, many of them of international interest, and the promoters are to be congratulated on the achievement of a Congress which is likely to be a new landmark in the science and practice of ophthalmology. The gathering should not only advance knowledge but engender a spirit of mutual respect and esteem among the participants. Besides the devoted work of Mr. Collins the arrangements, as far as they concern the English-speaking world, owe much to the labours of Sir John Parsons, Mr. Leslie Paton, and Dr. de Schweinitz, of Philadelphia.

THE PATHOLOGY OF TRYPANOSOMIASIS.

TRYPANOSOMES are harmful in many ways. Within the vessels their mere presence and multiplication may block capillaries and do mechanical damage; during their life or after their death they may form toxins causing perivascular inflammation. In the serous cavities they may multiply and cause irritation, giving rise, e.g., to pericarditis; invading the tissues they may set up inflammation and degeneration. The presence of trypanosomes in the tissues after death is not often reported. P. Regendanz and R. Hoeppli of the Hamburg Tropical Medicine School, who have just published [1] the outcome of their prolonged

[1] Arch. f. Schiffs-u. Tropen-Hygiene, July, 1929, p. 376.

investigations, believe it to be because autopsy is delayed too long, for the parasites are altered by post mortem changes more quickly in the tissues than in the vessels. The flagella disappear first, then the protoplasm assumes a rounded shape and loses its special staining affinities; the blepharoplast and nucleus persist longer, but are apt to be mistaken for bacteria unless examined under a high power, when their irregular edge and lighter central staining distinguishes them. Subjects of trypanosomiasis are apt to suffer from peri- and myo-carditis with dilatation; is the infection brought by the blood stream? The Hamburg investigators think not, but due rather to an extension from the pericardium within which the trypanosomes are growing; morbid changes are more advanced in the epicardium than in the heart, and in the superficial layers of the myocardium than in the deeper. The first histological evidence of trypanosome infection is an œdema which may be due to toxins, though such toxins have not yet been isolated. Into this œdematous area the trypanosomes having penetrated, they increase, setting up a small-cell infiltration similar to but less in degree than that of bacterial inflammation; the muscle cells degenerate later. Trypanosomes, living and moving, may be found in plenty in the fluids of serous cavities and in that of the conjunctival sac, even when they are but scantily present in the blood. Conjunctivitis is not unusual in trypanosome-infected animals; iritis and keratitis also occur, and living trypanosomes have been found in the anterior chamber. Thence they make their way along the lymph stream into the subconjunctival connective tissue, causing œdema and inflammation, and so reach the conjunctival sac, where they are most numerous about the fornix. This sequence of events was first observed with *T. equiperdum*, although most of the work was done with *T. gambiense* and *T. rhodiense*, of which the latter gives rise to the more acute infection in apes. Whether the growth of trypanosomes in serous cavities accounts for relapses will be discussed in a subsequent paper.

MINIMAL DOSES OF HEAVY METALS.

DR. Guiseppe Sabatini, professor of special pathology in the University of Rome, has been investigating[1] the effect of injecting into the circulation extremely small quantities of salts of the oligo-dynamic metals, such as copper, zinc, and mercury. The vogue of the infinitely small, he remarks, is continually extending its influence in biology, and even in clinical medicine. He has been impressed by the demonstrations of "ultravirus," of aphanozoa, of fatal anaphylaxis produced by minute doses of serum, of the powerful effects of imponderable amounts of hormones, and of the posology in fractions of a decimilligramme of pure alkaloids. In Italy there has been a tendency to reconsider the doses of commonly used drugs, and claims have arisen for remarkable effects from doses conspicuously smaller than those generally employed in therapeutics. It may easily be predicted that the edifice of necessary and sufficient therapeutic doses fixed by scientific medicine is not really on the verge of collapse, but according to Prof. Sabatini we should be guilty of stupidity to ignore such investigations altogether. His own experiments were inspired by the observations of A. van Egmond on the action of certain drugs on the bundle of His, and on the production of heart-block by the action of oligo-dynamic metals. This author showed that simple contact of the bundle of His with a copper wire 2 mm. in diameter caused heart-block. Having excluded the possibility of thermic effect, pressure, and galvanic current, he concluded that it was due to an infinitesimal chemical action on the cells in the bundle. In the same field of observation, Stock, in 1926, maintained the possibility of mercurial intoxication in man caused by the amalgam used in stopping carious teeth, and Seifert, examining several hundreds of syphilitic patients belonging to every social grade, noticed that about 80 per cent. of them had no teeth filled with metallic stopping, while in a series of patients with many filled teeth syphilis was much less prevalent than in others, and he suggests that the minute doses of mercury absorbed by the organism in these subjects may act as a prophylactic. The researches carried out by Prof. Sabatini fall into five groups: (1) chloride of copper, one milligramme dissolved in 2 c.cm. of distilled water; (2) chloride of zinc, in the same proportion; (3) bichloride of mercury, in the same proportion; (4) bichloride of mercury, half that strength; and (5) controls consisting of injections of 2 c.cm. distilled water only. These quantities were injected into a vein and samples of blood taken after 1 hour, 8 hours, and 24 hours. These samples were examined as to the number of red cells, the number of leucocytes, the leucocytic formula, and for glycæmia. The specimens showed very definite changes, the number of red cells and leucocytes being distinctly, and sometimes conspicuously, increased, while the glycæmic content was raised to about double the normal. The changes were transitory and a return to the previous condition took place after 24 hours. Dr. Sabatini is continuing his investigations especially with other salts.

[1] Policlinico, Medical Section, June 1st, 1929, p. 281.

RESEARCH IN TUBERCULOSIS.

TWO years ago the Prudential Assurance Company provided a new pathological department for the City of London Hospital at Victoria Park, and the report for 1928, recently issued, testifies very clearly to the value of this benefaction. The laboratory has examined nearly 10,000 specimens from the wards and out-patients during the year, and the report includes also reprints of four papers published by Dr. S. Roodhouse Gloyne and his assistants. The chief one is a useful review by Dr. Gloyne of the clinical pathology and bacteriology of fluids obtained by tapping the pleura. With Dr. J. R. Simpson he has also attempted, and failed, to produce tuberculous meningitis in rabbits. It is curious that generalised infections produced by intravenous injections in these animals hardly ever involve the meninges, and it is suggested that this is so because the bacilli do not lodge in the cerebral vessels; tuberculous meningitis is perhaps always preceded by lesions in the choroid plexuses. Lesser papers deal with the viability of tubercle bacillus at freezing temperature and with the relationship between syphilis and tuberculosis which seems to be very small. The whole report indicates a lively response to the help given by the Prudential Company and augurs well for the extension and expansion of activity which future years will doubtless show.

LUNATICS AS A PUBLIC DANGER.

Lord Alness, the Lord Justice-Clerk, has been commenting in the Glasgow High Court upon the danger to the community from the freedom allowed to persons of unstable mind. In the case to which our Scottish correspondent draws attention on p. 525 a man had been proved to be of unsound mind and unfit to plead. He was also described in the evidence as being in the same mental condition when released some time earlier from a mental institution. While thus at large he had shot a young woman dead and had attempted to shoot a man. The Lord Justice-Clerk, while refraining from attributing blame to individuals, suggested that the general position was disquieting and that the authorities should inquire whether some machinery could not be devised to prevent the recurrence of such deplorable incidents. Similar comments might at any time be made in England where full investigation has been officially made without any attempt to give effect to the resultant conclusions. Royal Commissions may make recommendations but, until some prominent personage is killed by a lunatic, it may be difficult to translate those recommendations

into law. More than one judge has warned the public in England of the consequence of exposing members of the medical profession to the risk of huge and capricious awards of damages for alleged negligence. When a jury gives a verdict of this nature, medical practitioners are scarcely encouraged to sign the certificates which are the statutory preliminary to a magisterial order for the detention of a lunatic in a suitable institution for treatment.

There is an allied question whether issues involving an exact estimate of medical skill are best determined by juries consisting entirely of laymen. In this connexion a correspondent in the daily press has lately been giving an interesting illustration. He describes his experiences as foreman of a jury at a trial at the Old Bailey in a case involving charges of fraudulent income-tax returns. The nature of the issues involved frequent references to columns of statistics and complicated figures and calculations. A woman member of the jury said to him at one point, "I do not know what they are all talking about: this is not a case that women should be asked to try, do you think?" So frank a confession by a layman faced with technical issues is significant. The correspondent remarks upon the incongruity of expecting persons who have had no financial training to adjudicate upon facts in which complicated figures form the material. How is it any more reasonable to expect 12 laymen to adjudicate upon complicated issues of medical diagnosis and treatment?

THE TASTE OF CHLORINATED WATER.

IT is well known that although one part of free halogen in a million of water will render drinking water sterile, yet the taste produced is offensive to most people. As this taste resembles that of iodoform and is not like that which would be produced by free chlorine itself, its investigation is a matter of considerable interest, both on theoretical and practical grounds. In the *Medical Officer* of August 17th Mr. B. A. Adams describes some work done by him which seems to show conclusively that the taste is to be attributed to the action of chlorine on salicylic acid or some of its derivatives extracted from the leaves or twigs of certain willows and waterside plants, such as the meadow-sweet (*Spirea ulmaria*). Mr. Adams points out that although it is usual to attribute the development of taste to phenolic bodies, it appears that only those which are associated with coal-tar products will produce the taste, and in some cases these have been shown not to be present. The phenols found in vegetable and animal substances do not appear to yield the taste, but natural salicylic acid (which cannot be suspected of containing even traces of phenol) will give a faint taste when present to the extent of only one part in a hundred millions of water if treated with 0·25 part of chlorine, as will sodium salicylate, phenyl salicylate, salicylaldehyde, and salicyl alcohol. On the other hand, salicin, methyl salicylate, acetyl salicylic acid and coumarin do not give the taste in any concentration examined. As salicin, which is an easily hydrolysed glucoside, occurs in large quantities, together with its appropriate hydrolytic enzyme, in many willows and poplars as well as in meadow-sweet, all of which are, along with other salicyl compounds, typical waterside plants, Adams experimented with this and with other natural salicyl compounds. He found that infusions of willows (*Salix fragilis* and *alba*), poplars (*Populus tremula, candescens, alba, nigra, deltoida, italica*), and meadow-sweet are all capable of producing an iodoform taste on chlorination, whilst the sallows do not invariably give the taste, and a large variety of other trees do not do so. The taste tends to be prevalent in autumn when there is a great fall of leaves and small twigs into the water, by which willows and meadow-sweet grow. It is easy, therefore, to see that an appreciable amount of salicyl compounds may thus pass into solution, and when the water, which is likely at this time to need chlorination more than at any other time, is so treated the taste is developed. A remarkable point brought to light in this research is the non-formation of taste when ammonium salicylate is chlorinated, a fact which throws some light on the use of ammonia in removing the taste from chlorinated water. Direct proof of the presence of salicylic acid or its derivatives in the water of any river or other natural water would be very difficult. The American workers who investigated the organic matter of lakes found it necessary to evaporate hundreds or thousands of litres of water in order to obtain enough to examine. Besides this it by no means follows that evaporation will leave all the organic matter behind. We feel, however, that Mr. Adams has sufficiently maintained his thesis, more especially as his experiments were made with well water, which may be considered as originally free from either salicyl compounds or their chloro-derivatives.

INSTITUTES OF RADIOLOGY.

THE twelfth volume of the series called "Methods and Problems of Medical Education," issued by the Rockefeller Foundation, is concerned with rontgenology and radiation work in general. Beautifully printed and lavishly illustrated it describes 39 installations in different parts of the world, five of them in Britain—Edinburgh, Liverpool, Manchester, Cancer Hospital, and Guy's. Despite the general title this volume will be of less interest to teachers than to those engaged in the therapeutic and diagnostic applications of radiations. For these it will be particularly useful, because the technical details of the arrangements are really important, and not, as is often the case, matters of preference or prejudice. Especially informative is Dr. A. E. Barclay's description of the X ray department which he organised at the Royal Infirmary in Manchester, for he gives careful and detailed lists of the equipment and personnel, with their cost, which are needed for hospitals of different sizes and varying characters, and discusses many of the problems of construction and arrangement with much informative detail. The account of the Finsen Institute in Copenhagen is also conspicuous and gives us a pleasing photograph of Finsen's statue in the grounds. Careful study of books such as this should do something to correct the parochial experience which our in-bred hospitals too often show.

PREVENTING DIPHTHERIA IN NEW YORK.

IT is now on record that in certain districts in America diphtheria has been almost entirely eliminated as a result of immunising all children with toxin-antitoxin. In Auburn, for example, the death-rate from diphtheria has been reduced from 38·4 to zero, while New York State, which began a campaign three years ago, has a mortality and morbidity rate considerably lower than New York City. On another page we comment on a collection of studies from the laboratories of the health department of New York City which show the overwhelming evidence now available of the value of therapeutic immunisation. These considerations, coupled with the fact that in New York City there were last year over 10,000 cases of diphtheria with 642 deaths, led to the formation of a "Diphtheria Prevention Commission," under the presidency of Mr. Thomas W. Lamont, which launched a campaign early this year. The methods employed in this campaign and some of the early results are recorded in a handbook, entitled "How to Protect your Children from Diphtheria," which has been prepared under the supervision of Dr. Shirley W. Wynne, commissioner of health for the City of New York, and edited by Mr. E. Fisher Brown. Mr. Lamont gave an address to the editors of the various city newspapers at the Harvard Club in January, and leading articles appeared in the more important journals during the following week indicating the scope of the campaign. Some of these are reproduced in the handbook. The Health Department wrote to 11,345 practising physicians asking them to

circularise their patients with notices prepared by the department urging immunisation, and it was arranged to approach 150,000 families for a test demonstration with the coöperation of five medical societies. Toxin-antitoxin is prepared by the Health Department and is available at 750 pharmacies where physicians can at any time obtain what supplies they may need in their private practice. At the same time 41 stations have been opened in various parts of the city where free immunisation treatment can be given. Dr. Wynne is quite clear as to the exact part which the private practitioner and the public health official have to play in the campaign. At the inaugural luncheon he said:

> The public owes the medical profession a more liberal attitude in the matter of fees. The public must learn to pay for preventive medicine as ungrudgingly as it pays periodically for its theatre tickets and moving-picture shows. I am not willing that the Department of Health be the official doctor, nurse, clinic, and hospital regardless of the ability of the individual citizen to pay the doctor for such a service. Nor is the department prepared to undertake all these services. We are, however, willing and prepared to immunise every unprotected child where its parents for any reason are unable to pay for the same.

Ten years ago the Schick test and toxin-antitoxin immunisation were introduced into the municipal schools in New York, and in examining the results it is estimated by Dr. William H. Park that the amount of diphtheria reported among those receiving immunising injections was only a fifth of that among those not injected. Out of 500,000 immunised not a single patient suffered any ill-effects. These results are excellent, particularly when it is remembered that of all children receiving toxin-antitoxin probably only 80 per cent. are definitely immunised, but it is desirable to extend the protection to all children between the ages of 1 and 9, estimated at 750,000, in the city of New York. It is with this object that the new campaign has been started, and already in March it was possible to state that there had been since the beginning of the year a decrease of more than 30 per cent. in the diphtheria rate and in the death-rate. With close coöperation between public health authorities, parents, and doctors, it is hoped to eliminate the scourge of diphtheria from the city where Dr. Park originated his method of protection.

APPENDICITIS IN PREGNANCY.

SINCE a large percentage of pregnant women complain of abdominal pain, vomiting and other symptoms which disappear either during or after the pregnancy, cases of acute abdominal disease occurring in pregnancy may be masked. A. L. McDonald in a recent paper[1] compares a large series of cases of appendicitis in pregnant with another series in non-pregnant women. Apart from difficulties in diagnosis pregnancy increases the dangers of the disease. As the uterus rises in the abdomen, the cæcum tends to be less protected. The omentum is generally to be found resting on the uterus, far removed from its normal situation in close relation to the intestines, and some authorities state that the uterus as it rises pulls the cæcum away from the less absorbent pelvic peritoneum. General peritonitis is therefore on theoretical grounds more likely to follow perforation of the appendix during pregnancy, and local abscesses to be less frequent. Dr. McDonald's statistics support this view. The series he has used as a control is that collected by E. P. Quain, consisting of 1000 cases, and he has compared with these a series of 204 cases occurring in pregnant women, studied by E. Jerlov, and a group of 70 investigated by himself. The control series show general peritonitis in 16 per cent., and localised abscesses in 29 per cent. In the pregnant patients—a much smaller group—these figures are exactly reversed, namely, general peritonitis in 29 per cent., and a localised abscess in 16 per cent. The mortality of appendicitis complicated by general peritonitis, which is 11 per cent. in Quain's cases, rises to 30 per cent. in the group of pregnant women, while the mortality with a localised abscess rises from 2.4 per cent. to 23.5 per cent in pregnant women. The lesson of the investigation is that delay in the diagnosis of appendicitis is even more dangerous during pregnancy than at other times, and that every effort should be made to operate on cases of appendicitis during pregnancy before the infection passes beyond the appendix. The mortality is greater when the patient aborts or goes into premature labour; the author notes, however, that the onset of labour depends largely on the severity of the toxæmia. Many cases do not die because they abort, but abort because they are dying. Pregnancy does not in any way modify the surgical treatment of acute appendicitis. Every effort must be made to prevent the onset of labour: if delivery is inevitable, it should, if possible, be vaginal and not abdominal.

[1] Amer. Journ. of Obstet. and Gyn., 1929, xvii., 110.

TWENTY YEARS' EXPERIENCE AT A FEVER HOSPITAL.

THE special characteristic of the study of scarlet fever, diphtheria, and enteric fever, recently published by the Medical Research Council,[1] is that one observer, Dr. E. W. Goodall, was responsible for the clinical work throughout the period under survey. The statistics, which refer to more than 21,000 cases of scarlet fever, 15,000 cases of diphtheria, and 2000 cases of enteric fever, have, therefore, a peculiar value, since those already available in the Annual Reports of the Metropolitan Asylums Board and elsewhere have been compiled from several hospitals, and conclusions drawn from their study may have been vitiated by variations in standards of classification. Tables are given here showing for each disease the age distribution, the variations from year to year, the seasonal distribution, and the age and seasonal incidence of complications, also the relation of complications to form of disease, and the fatality. The statistics here presented do not show any relation of school closure during the summer holidays to the incidence of scarlet fever, though in diphtheria a diminution was found. Since a reduction of scarlet fever cases is found almost every year for the holiday period in the notification statistics for London as a whole its existence cannot be doubted. The statistics for the whole of London certainly contain a moderate percentage of erroneous diagnoses which have been eliminated from the figures supplied by Dr. Goodall, but the diminution is too great to be attributed to this cause. Another discrepancy between the two sets of figures concerns seasonal variations at different ages. A table in the study just published shows a marked difference of seasonal variation between the first and second decades in scarlet fever, though in diphtheria there was little change. The charts published in the M.A.B. reports indicate that the seasonal variation is always largest in epidemic years, and may be quite absent in years of low prevalence, like 1903 and 1910. The large epidemics of 1907 and 1914 must be considered in relation to the figures presented. The tables dealing with form of disease, complications, and fatality mostly break new ground. The characteristic autumn rise in scarlet fever is shown to be almost entirely due to the mild cases; the distribution of septic cases throughout the year shows no regular trend. Among scarlet fever complications albuminuria is rather more frequent in late summer, but otitis, nephritis, and adenitis more so in the first half of the year. Otitis is much more frequent in infancy, and the incidence regularly decreases with age, both in scarlet fever and diphtheria. Albuminuria and adenitis follow the same course, but the differences are less marked. Nephritis is less common under 4 and over 20 than at inter-

[1] Medical Research Council Special Report Series, No. 137. Scarlet Fever, Diphtheria, and Enteric Fever, 1915–1924; a Clinical-Statistical Study, by E. W. Goodall, M. Greenwood, and W. T. Russell. H.M. Stationery Office. Pp. 58. 2s.

mediate ages. All complications, except relapse and secondary tonsillitis, are much commoner after septic than after mild scarlet fever. With one or two exceptions complications were less frequent in the quinquennium 1910–1914 than between 1895 and 1899; but the intervening periods show higher rates than either. In diphtheria, laryngeal and rhinorrhœal forms occur more frequently in young children. At ages over 25 years 98 per cent. of the cases are faucial. Albuminuria shows a maximum age incidence at 6 years, and paralysis at 9 years. Otitis is most frequent in infancy. As with scarlet fever, complication-rates are somewhat lower in the last quinquennium. In enteric fever complications become more common as age advances and were higher for females than males, with the exception of otitis. In all three diseases the case fatality decreased during the periods, but whereas in the first two diseases the decline was regular, in enteric fever a minimum was reached in the third quinquennium, and a rise occurred in the fourth. The authors of the report point out that data referring to patients not wholly drawn from one district, and to a period of change in the extent to which the public have resorted to institutional treatment of the diseases, cannot throw light on the real incidence of these diseases, while even the statistics of fatality must be interpreted with caution. On the other hand the expert statistical analyses of the forms and complications of the diseases here presented are of unusual value and interest.

ÆSTHETICS AND MENTAL DEFICIENCY.

IN the annual report for 1928–29 of the Metropolitan Asylums Board Dr. E. B. Sherlock criticises the current standards of diagnosis of mental deficiency. Like many other examiners he holds that too much stress is laid on the cognitive side and upon the results of the application of intelligence tests, other aspects of their psychological make-up being ignored. More important than testing is the question of guidance and training, and Dr. Sherlock makes a plea for the development of the æsthetic sentiment in mental defectives and for the cultivation of such sense of beauty as they possess, as a contribution to their happiness and the moulding of their personalities. A preliminary difficulty to be faced is the fact that the æsthetic sentiment is conditioned very largely by the stage of intellectual development; Dr. Sherlock therefore set himself to discover in what degree æsthetic sensibility is normally present in defectives. A true æsthetic sensibility is a fairly late product of development, even in the normal. Its earliest manifestations can only be some evidence of interest or pleasure in objects usually regarded as beautiful, coupled with practical attempts at reproduction or self-expression in some artistic form. It was in these two directions that Dr. Sherlock sought for evidence, taking as his subjects the defectives in Darenth Training Colony. He describes two tests of sensitivity: one, in which the child's opinion of the pleasantness or otherwise of a variety of odorous substances was required, and a second, in which he collected the pleasurable impressions of the children derived from a performance of Cinderella. As a practical test each child was required to make a drawing of a church. It may be questioned whether inferences could fairly be made from the responses to these sample tests. Dr. Sherlock does not claim that the inquiry revealed either any sensitivity or talent in defectives different in kind from that of normals, and in degree both were, on the average, below normal. As tests, then, they reveal nothing beyond what is already known. In our view no test of æsthetic sentiment is ever likely to contribute much to a diagnosis of mental deficiency, the ultimate criterion of which is social inefficiency. The cynic might point to instances of supernormal æsthetic development accompanied by almost complete incapacity to attend to the practical affairs of everyday life. The real value of this or any similar inquiry rests rather in the fact that it may reveal educational possibilities in individuals. Where a definite sensitivity or talent is shown, it is the duty of the educationalist to foster it. Modern educational systems are not neglecting this matter. The cultivation of the child's sense of beauty, whether in nature or art, is an integral part of education to-day, perhaps more in the elementary than in the secondary school. That mentally defective children are not without some elementary sense of beauty, in the form of appreciation of rhythm or tone, or of relations of forms and colours is well known to special school teachers. Dr. Sherlock is disposed to doubt whether the possibilities in these directions are being fully utilised and the question he has raised appears to merit further inquiry.

STANDARDS OF FITNESS IN AIRMEN.

WE do not yet know the name or even the nationality of the winner of the Schneider Cup, but we know a good deal about his physiological make-up. He will have a visual acuity of 6/6, he will be able to exercise single vision binocularly, at very near range, and to maintain binocular vision under increasing disability. His visual field will be wide and his colour sense accurate. His Eustachian tubes will be free and efficient to regulate and equalise the continual changes of atmospheric pressure. His respiratory efficiency will be high, and his chest expansion good, and his cardiovascular system equal to the maintenance of an adequate circulation under adverse conditions of strain and low oxygen pressure. In other words, he will possess the physical and physiological attributes of any good pilot as well as a neuromuscular coördination above the normal, but in addition he must have special ability of a high order. As SIR SAMUEL HOARE has pointed out, it is the human side of the enterprise for the Schneider Cup that is more valuable and enthralling than the actual production of a record machine. At an early stage in the development of the Royal Air Force it was found that the existing state of medical knowledge was insufficient to entitle medical officers to give trustworthy opinions on the unsuitability or otherwise of candidates for flying. It was found that men who were apparently fit in every way, some of them even noted for their athletic prowess, were unable to acquire the art of flying, or having acquired it painfully and expensively, never became safe pilots. The question really turned on the possession of peculiar aptitudes—a question to which, of course, industrial psychologists have been devoting their attention for many years in other fields; but which at once assumed an urgent practical importance when it had to be answered, and to begin with in the stress of war, concerning the profession of aviation, in which ineptitude spells calamity. Nowadays the medical tests to which the candidates for the flying services are exposed, whilst making no pretence that every candidate selected by them will turn out to be a good pilot, are definitely selective in the sense that they are directed definitely towards the ascertaining of capacity for performance in a particular field—viz., aviation.

Some of the standards exacted by the medical selectors of flying personnel for the R.A.F. may be quoted. It is not surprising that sickness in swings or trains should debar candidates from admission, or that visual acuity of high degree is insisted on. But it is noteworthy that, according to the Manual for Medical Officers of the Royal Air Force, no candidate, whatever his visual acuity, may be passed into the service who reveals a manifest hypermetropia of − 2·00 D. sph. or over. The reasons for this restriction are that (1) the continued effort to focus rays correctly on the retina is apt to induce a tonic action of the ciliary and internal recti muscles, which tends to produce errors of judgment of distance in flying; (2) loss of accommodation is liable to occur under flying conditions, leading to bad landings; and (3) quite apart from flying the hypermetropic eye is more easily fatigued by close work or glare. Lack of true ocular balance is the most common cause of bad landings. Exophorics (sufferers from external lateral deviation)

tend to flatten out their aircraft too early, having judged the ground to be nearer than it is; conversely, esophorics are inclined to fly into the ground. The need for excluding those with defective visual judgment from the flying services is emphasised by the distortion of objects when seen from the air—the verticals are fore-shortened, shadows are viewed from an unfamiliar aspect, and the pilot's judgment of distance is anyhow likely to be disturbed by the unusual speed at which he is travelling. At one time, in some countries great importance was attached to the supposed "motor-sensing functions" of the vestibular apparatus, but it has been found that its reactions to rotation are not reliable indications of flying ability. The so-called otolithic functions of the semi-circular canals afford little information about position in space, which is estimated chiefly by deep muscle sensation; their integrity is nevertheless important for air work, probably for the exertion of steady, subconscious neuro-muscular control. The rotatory chair is used now not so much as a test of the vestibular apparatus but as a means of bringing out abnormal reactions such as giddiness, nausea, vertigo, or anxiety in men whose history throws some doubt on their ability to perform aerobatics. If an aeroplane is spinning, and thus out of control, the human subject must himself be fit to take the action necessary to stabilise the machine. To test this power he sits on a chair as in an aeroplane, with eyes open and directed inside the knee furthest from the direction of spin, and is then subjected to a relatively fast spin ten times in 20 seconds. In fit pilots, especially those accomplished in aerobatics, rotation has little effect on pulse-rate or arterial pressures. A rise in pulse-rate and systolic and diastolic pressure is associated with vertigo and nausea, a fall in diastolic pressure with fainting; while in anxious subjects an anticipatory rise of pulse-rate and systolic pressure before rotation may or may not be accentuated by rotation.

Broadly speaking, it may be said that the tests, of which only a few examples have been given, are directed to ascertain: (1) that the candidate possesses sound physiological control over his circulatory, respiratory, and nervous systems, on which the stresses of flying and of altitude chiefly fall; and (2) is in possession of sound perceptive faculties and of a sound effector motor organisation through which his perceptive faculties can function; the elucidation of the latter factor is sought by the aid of tests of a definitely vocational character. Much has been found out, but much still remains to find out. It might be thought that experience of this kind had no immediate bearing on general medical practice, but this is not true for any practitioner who regards every patient who comes to see him as a candidate under examination for his fitness to perform his allotted or chosen task in life. His chief concern is in the patient's capacity for such performances. The standard use of physiological and psychological (using the word in its broadest sense) tests and of medical examinations of men in apparent health, conforms with the ideals of clinical medicine set forth by Sir James Mackenzie when he started his clinical research centre at St. Andrews—namely, to discover the signs and symptoms of failing health in the pre-sickness stage.

Lieut.-Colonel A. J. H. Russell, I.M.S., has been appointed medical assessor to the Royal Commission on Labour in India and will accompany the Commission during its tour through India this winter. Colonel Russell has been Director of Public Health in Madras since 1922.

Sir John Campbell, who died at Belfast on August 31st, was senior surgeon to the Samaritan Hospital for Women and consulting surgeon to the Maternity Hospital. He figured largely in public life, being chairman of Convocation of Queen's University and representative of the University in the Northern Parliament of Ireland.

The Clinical Interpretation of Aids to Diagnosis.

A Series of Special Articles contributed by Invitation.

XLII.—SIGNIFICANCE OF THE ACID BASE BALANCE IN THE BLOOD.[1]

SOME 16 years ago, as can be readily seen from a study of the literature of the time, the disturbances of the acid-base balance in disease were subjects of controversy and vague speculation. Since then clear ideas on the subject and methods of expressing deviations from normal in figures have developed, and the vague speculations have been replaced by definite and wide accepted facts. It is necessary now to use precise terms in order to avoid vagueness. The significance of the terms in common use is explained below.

Dissociation; Meaning of cH and pH.

When dissolved in water strong acids, like most salts, dissociate completely or almost completely into ions—e.g., $HCl \longrightarrow H^+ + Cl^-$. The kations (marked with a + sign) carry positive electrical charges and differ from the corresponding atoms by having given up one or more (depending on the valency) electrones, while the anions (carrying a − sign) carry negative charges and have gained one or more electrons. Weak acids, however, dissociate only partially, for example, acetic acid

$$CH_3COOH \rightleftarrows H^+ + CH_3COO^-$$

The weaker an acid the less its dissociation into ions, and at the limit we have water which dissociates very slightly, as $H_2O \longrightarrow H^+ + OH^-$. Similarly bases dissociate to a degree depending on their strength—e.g., $NaOH \longrightarrow Na^+ + OH^-$. The dissociation of weak acid is a reversible reaction; if the concentration of the hydrogen-ion or of the anion is increased the reaction shifts in the direction of the undissociated molecule. It is the presence of hydrogen ions in all watery solutions and the part they play in such reversible reactions that make hydrogen-ion concentrations of great importance in biochemistry.

The *hydrogen-ion concentration* (represented by the symbol cH) is expressed quite simply by the number of grammes of hydrogen present in the ionic form per litre; thus in N/100 hydrochloric acid, with 1/100 gramme of hydrogen ion per litre cH 1/100; while in N/100 acetic acid, in which only 1/78 of the acid present is dissociated, there is only 1/7800 gramme of hydrogen ion per litre (cH = 1/7800). In pure water, at 38° C., cH = 1/5,000,000.

When the hydrogen-ion concentration of a solution is the same as that of water the solution is said to be neutral; a solution with a cH greater than this is acid and one with a lower cH is alkaline. In biochemistry and medicine we have to deal with fluids with a cH near that of pure water, and to avoid cumbrous figures another method of representing hydrogen-ion concentration—pH—is used; pH = log 1/cH, or if $cH = 1/10^x$, pH = x. *Table II.* shows the pH corresponding to the cH of various fluids. When the cH increases (that is, when the solution becomes more acid) the pH decreases, and vice versa; increasing the pH of a solution by 1·0 is equivalent to dividing the cH by 10; increasing pH by 0·30 is equivalent to multiplying the cH by 2.

It is probable that the disadvantages of the general use of the expression pH outweigh the advantages, but its use is now firmly established.

Buffers.

As the range of hydrogen-ion concentration compatible with life is a narrow one, it is necessary to

[1] The diagnosis of acidosis, alkalosis, and ketosis will be discussed next week.

prevent great variation. This is done by removing excess of acid or base, but during the process, or if the removal is not complete, the effect of such excess is mitigated by the buffer systems of the body. These buffer systems consist of mixtures of weak acids with their corresponding salts; although such a mixture contains free acid its hydrogen-ion concentration may be low, since the dissociation of the free acid is very slight in the presence of its fully dissociated salts—it is given by the equation

$$cH = K\frac{c(HA)}{c(NaA)}$$

where c(HA) is the concentration of free weak acid, HA c(NaA) the concentration of its salts, and K a constant for this acid (the dissociation constant). For convenience this equation will be quoted below as equation (1).

If a strong acid like HCl is added to such a mixture it combines with the base of the NaA forming NaCl, and setting free HA, which is very little dissociated, so that only a slight rise of hydrogen-ion concentration takes place. Similarly if a strong base like NaOH is added it combines with some of the free acid and the cH is but little reduced.

The chief buffers in the body are carbonic acid, H_2CO_3, and its salts, the bicarbonates, chiefly $NaHCO_3$, and proteins, which behave as weak acids at the reaction of the body and form salts. When CO_2 is retained in the body the concentration of H_2CO_3 in the body fluids is increased; part of this H_2CO_3 combines with the base of protein salts, setting free protein in the acid form (which is but slightly dissociated) and part remains as free H_2CO_3, which, however, is very slightly dissociated in the presence of its salts. Using equation (1) in its most familiar form (the Henderson-Hasselbalch equation), which we may call equation (2),

$$= K_{H_2CO_3}\frac{c(H_2CO_3)}{c(NaHCO_3)}$$

we can calculate the increase in cH produced by a given increase of H_2CO_3. The amount of CO_2 formed by a resting man in one minute (about 0·33 g.) would raise the cH of 50 litres (about the volume of fluid in the body) of distilled water to 1/40,000 (pH = 4·6); but would only change 50 litres of a solution of H_2CO_3 and $NaHCO_3$ such as is found in normal plasma, from cH = 1/25,000,000 (pH = 7·40) to cH = 1/23,000,000 (pH = 7·36), or 50 litres of blood, which is better buffered owing to the presence of proteins, from pH 7·400 to pH 7·397.

If an acid such as HCl is added to blood the larger part combines with the base of the protein salts, setting free protein acid, and some with the base of bicarbonates, setting free H_2CO_3. The chief buffers of blood in this way are thus the proteins, especially hæmoglobin, but because the free H_2CO_3 and bicarbonate can be estimated attention is mainly fixed on these two. Similarly excess of base combines with acid protein, and with free H_2CO_3.

Since equation (1) applies to proteins (P), we can write it also as equation (3).

$$= K_P\frac{c(HP)}{c(NaP)}$$

and see that the ratio of protein present in acid form to that present as salt varies with the hydrogen-ion concentration. Herein lies one reason for the importance of changes of cH to living organisms; the chemical state of one of their essential constituents changes proportionally to changes of cH.

Removal of Acid.

One of the chief factors controlling respiration is the cH of the blood. When this is raised or lowered the respiratory exchange is increased or decreased. Respiration thus not only removes excess CO_2 but also compensates for the effects of retention of bases or other acids. When an acid such as HCl has been retained in the body, combining with some of the bicarbonate, so that $c(NaHCO_3)$ in equation (2) is reduced and cH increased, increased respiration takes place washing out CO_2 until $c(H_2CO_3)$ is so reduced that the ratio

$$\frac{c(H_2CO_3)}{c(NaHCO_3)}$$

and hence cH are again normal. When this has occurred the ratio of protein acid to protein salt equation (3) must again be normal and, since the total amount of protein cannot have been reduced, c(NaPr) must be restored to normal and all the retained acid must have combined with $NaHCO_3$. When a retention of acid is thus "compensated" by washing out CO_2, the retained acid has taken base only at the expense of the bicarbonates, and its concentration can be estimated by the amount that the bicarbonates are reduced. The base combined as bicarbonates in the body fluid thus acts as a reserve which can be used up to neutralise retained acids, without change in the cH or utilisation of base combined with the other acids of the body fluids; it is therefore spoken of as the "*alkali reserve*." When excess of base is present in the blood, $c(NaHCO_3)$ in equation (2) is raised, the cH consequently lowered, and respiration depressed.

Most organic acids are oxidised into CO_2 and water; this oxidation is so rapid that acids such as citric and tartaric when taken by the mouth cause no disturbance of the acid-base balance. Mineral acids and bases, and organic acids and bases that have escaped oxidation or other metabolic change, are removed by the kidneys. But the kidneys do not merely remove surplus amounts of any particular acid or base but also "compensate" for variations of $c(H_2CO_3)$ by excreting an acid urine, when owing to retention of CO_2 the cH of the plasma is too high; thereby they reduce the amount of fixed acid in the body fluids, and raise the amount of base available to form bicarbonates, so that $c(NaHCO_3)$ tends to be raised and the ratio

$$\frac{c(H_2CO_3)}{c(NaHCO_3)}$$

and consequently the cH tend to return to normal. Similarly when $c(H_2CO_3)$ is reduced by overbreathing, alkaline urine is passed with a consequent tendency to a compensatory fall of $c(NaHCO_3)$.

When an acid urine is passed a considerable part of the acid is neutralised by ammonia formed in the kidney, but ammonia plays no part in neutralising acids in the blood and tissues.

Disturbance of Acid-base Balance.

In disturbances of the balance of acids and bases there may be little or no disturbance of cH, nor of the buffers other than the carbonic acid-bicarbonate system, owing to the success of compensation; but there must always be a change of concentration of free carbonic acid or bicarbonate or both. The concentration of these two substances in the blood or plasma are therefore used as indices of disturbance of the balance. The concentrations of free carbonic acid and of bicarbonates are usually expressed as the number of cubic centimetres of CO_2 gas in these two forms per 100 c.cm. Thus 100 c.cm. normal plasma contains 55 to 65 c.cm. and 100 c.cm. of normal blood, 46 to 54 c.cm. of CO_2 combined as bicarbonate, and about 1 20th of these amounts of CO_2 as free carbonic acid.

Disturbances of acid-base regulation are most conveniently classed in two groups: (1) those that primarily cause changes in the concentration of free H_2CO_3; and (2) those that primarily change the concentration of bicarbonate.

If the word "acidosis" is to have any definite meaning it should be used for type 2 (*a*) in Table I.; type 2 (*b*) may be called alkalosis. Excretion of acetone bodies in the urine is best called ketosis, thereby avoiding confusion with other conditions in which the plasma bicarbonate may be reduced, and recognising the fact that a disturbance of the acid base balance does not necessarily accompany the excretion of acetone bodies in the urine. The terms acidæmia and alkalæmia have been proposed for increase and decrease of the cH of the blood.

In type 1 (*a*) interference with respiration owing to failure of the heart to pump blood through the lungs sufficiently rapidly or to disease of the lung would seem a likely cause of CO_2 retention, but actually, since it is much more difficult to get oxygen in than to get CO_2 out, the CO_2 is usually kept down to normal levels in the efforts to take in sufficient oxygen.

TABLE I.—*Types of Disturbance of Acid-base Balance.*

1. *Affecting* $c(H_2CO_3)$.	2. *Affecting* $c(NaHCO_3)$.
(*a*) *Increase.*—Increased formation—violent exercise. Impaired elimination. Depression of respiratory centre by narcotics, and sleep. Interference with respiration (disease of heart or lungs). Breathing CO_2.	(*a*) *Decrease.*—Excessive ingestion of acids, or potential acids (NH_4Cl or $CaCl_2$). Excessive formation of acids—lactic acid in exercise. Failure of oxidation of acids—especially acetoacetic acid. Failure of excretion of acids in nephritis. Loss of base.
(*b*) *Decrease.*—Overbreathing—voluntary, in hysteria, emotional, as a result of peripheral stimuli, in fevers, at high altitudes, in renal asthma.	(*b*) *Increase.*—Excessive ingestion of bases ($NaHCO_3$) or potential bases (e.g., sodium citrate). Loss of acid.

In the same way in type 1 (*b*), when the atmospheric oxygen pressure is reduced at high altitudes, the excessive breathing required to take in sufficient oxygen reduces the H_2CO_3 in the blood below normal so that at 15,000 feet the pH may rise to 7·5 or 7·6. The kidneys can remove moderate amounts of acid or base as fast as they are formed or ingested; it is only when the amounts are excessive or the kidneys damaged that appreciable acidosis or alkalosis occurs. Thus a patient may pass considerable amounts of acetone bodies in the urine without any reduction of both $c(H_2CO_3)$ and $c(NaHCO_3)$ are reduced, and it may be difficult to decide which was the primary change. However, as a rule, the compensation is not complete—that is, the cH is not brought completely back to normal, so that measurement of cH settles the question; in many cases also the history excludes any doubt.

Effects of Disturbance.

Disturbances of the acid-base balance produce general effects only in so far as the cH of the body fluids is altered. Within limits increase of cH has little effect beyond causing hyperpnœa. The acidosis produced by NH_4Cl and $CaCl_2$ is followed by a profuse diuresis, and has been used for treating œdema in nephritis; also increase of cH appears to reduce the irritability of the neuromuscular junctions and NH_4Cl acidosis has been used for the treatment of tetany in children due to low plasma calcium. The bad effects of severe NH_4Cl acidosis found by J. B. S. Haldane in experiments on himself were probably due to an extremely severe local acidosis in the liver, where neutral NH_4Cl was converted into an acid mixture of urea and hydrochloric acid; such an intense local production of strong acid does not occur in any natural acidosis. It is significant that violent exercise normally produces an acidosis with great increase of cH, since owing to the increased production of CO_2 at the same time it is impossible to compensate for reduction of $NaHCO_3$. The acidæmia at the end of a quarter-mile race must exceed anything seen in pathological conditions except just before death. Neither uræmia, nor the

TABLE II.—*Examples of Disturbance of Acid-base Balance.*

Type.	—	pH.	cH.	Bicarbonate c.cm. of CO_2 per 100 c.cm. Plasma.	Bicarbonate c.cm. of CO_2 per 100 c.cm. Blood.	Free H_2CO_3 c.cm. of CO_2 per 100 c.cm. plasma.	—
—	Norma.	7·30 to 7·45	1/20,000,000 to 1/28,000,000	55–65	46–54	2·5 to 4·0	—
1 (*a*)	CO_2 Breathing.	7·10	1/12,500,000	65	54	6·5	Primary increase of $c(H_2CO_3)$.
1 (*b*)	Voluntary hyperpnœa.	7·60	1/40,000,000	50	43	1·6	Primary decrease of $c(H_2CO_3)$. Some compensatory reduction of $c(NaHCO_3)$. Tetany.
	High altitude. Compensated.	7·40	1/25,000,000	40	34	2·0	Primary decrease of $c(H_2CO_3)$. Compensatory reduction of $c(NaHCO_3)$ by excretion of base in urine.
2 (*a*)	Ketosis (starvation). Moderate acidosis. Compensated.	7·40	1/25,000,000	45	38	2·2	Primary reduction of $c(NaHCO_3)$ by retained acetone bodies. Compensatory reduction of $c(H_2CO_3)$.
	Exertion. Medium acidosis. Uncompensated.	7·15	1/14,000,000	38	32	3·4	Primary reduction of $c(NaHCO_3)$ by lactic acid.
	Nephritis. Severe acidosis. Uncompensated.	7·10	1/12,500,000	15	13	1·5	Primary reduction of $c(NaHCO_3)$ by retained H_3PO_4 and H_2SO_4. Some compensatory reduction of $c(H_2CO_3)$. No signs of uræmia. Blood-urea 0·32 per cent.
2 (*b*)	Dosage with $NaHCO_3$. Mild alkalosis. Compensated.	7·43	1/27,000,000	78	65	3·6	Primary increase of $c(NaHCO_3)$. Rather high $c(H_2CO_3)$.
	Pyloric obstruction. Severe alkalosis. Uncompensated.	7·60	1/40,000,000	119	99	3·8	Primary increase of $c(NaHCO_3)$ owing to loss of HCl by vomiting. Collapse, cyanosis, feeble breathing, tetany.

$c(NaHCO_3)$ or increase of cH, and large doses of aklalis such as grs. 300 of sodium bicarbonate may be taken daily without an increase in $c(NaHCO_3)$.

Compensation.

In all these conditions attempts at compensation take place; in particular, in type 1 (*a*) alkali is excreted in the urine so that $c(NaHCO_3)$ is reduced, while in 2 (*a*) CO_2 is washed out by increased respiration and $c(H_2CO_3)$ is reduced. Thus in both types symptoms of diabetic coma (other than hyperpnœa) are due to acidosis, per se, nor are they improved by alkalis. There is therefore no evidence that acidosis is the cause of any disease.

The conditions in types 1 (*b*) and 2 (*b*), in which the change is towards the alkaline side, are more serious. In the first place compensation presents difficulties; compensation for reduced $c(H_2CO_3)$ is slow, so that accommodation to high altitudes takes some weeks, and compensation for increased

c($NaHCO_3$) involves reduced respiration with consequent reduction of oxygen intake.

When uncompensated, both these conditions lead to a reduction of cH, which is accompanied by interference with the oxygen supply to the tissues and various nervous manifestations. When the cH is reduced hæmoglobin gives up oxygen to the tissues less readily, so that the body may be starved of oxygen although the blood is well oxygenated; and with reduction of cH the neuro-muscular junctions are more irritable, so that tetany or even general convulsions may develop. A mild ketosis is frequently found in conditions in which the blood cH is decreased.

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Special Articles.

ON THE VISCERAL LESIONS THAT MAY ACCOMPANY EXPERIMENTAL VACCINIA IN RABBITS.

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IT is the purpose of this communication to place on record certain observations on a subject to which attention has been drawn by Douglas, Smith, and Price (1929) in a recent important paper.

That the virus of vaccinia is capable of invading the system from a skin area in which it has been inseminated and may be recovered from the blood and organs, though at times with considerable difficulty and by the aid of special methods, is now fully recognised. It was largely the work of Ohtawará (1921) based on the intratesticular method of virus-propagation devised by Noguchi (1915) that paved the way for demonstrating experimentally this capacity of virus to invade. The new knowledge accorded well with what we have long known of the symptomatology of localised vaccinia, both in man and animals, as a febrile disease accompanied, it may be, by at least one clinically demonstrable visceral disturbance—viz., acute splenomegaly. So long as the ordinary cutaneous strains of lymph continued to be used for the study of experimental vaccinia in rabbits, there was no good evidence that such virus, though capable of invading, had also the power to produce discrete naked-eye lesions in viscera after simple cutaneous insemination. The early work of Calmette and Guérin (1901) showed, indeed, that after intravenous introduction of such virus, vaccinial lesions were liable to appear on shaved areas of skin. In eliciting even this simple and striking phenomenon, however, subsequent observers have not been invariably successful and, doubtless, the reason for the failure has to be sought in the employment of inadequate doses of virus. It was, in fact, the comprehensive and minutely documented work of Camus (1917–18) which demonstrated clearly and for the first time that vaccine virus of cutaneous source was capable, when adminstered intravenously and in adequate dose, of producing characteristic vesicles and papules about the mouth, lips, nose, tongue, buccal cavity, eyelids, palpebral conjunctivæ, and genital orifices of experimental animals.

The work of Camus, comprehensive and detailed as it was, does not appear to have received the attention it undoubtedly merits as a fundamental contribution to this subject. Camus describes and figures the lesions of generalised vaccinia not only in rabbits, but also in guinea-pigs, dogs, cats, bovines, and monkeys. These lesions were invariably produced provided an adequate dose of a "purified" virus was inoculated into their veins. Adequacy of dose was of prime importance. While the generalised lesions in rabbit and guinea-pig were largely confined to the sites mentioned, and were only occasionally noted in the unshaved skin, in the dog and cat cutaneous lesions were the rule. It does not appear that Camus noted any visceral lesions, regarded by him as vaccinial, in those rabbits which died either owing to the intensity of the eruption itself or from secondary bacterial infections. It is, however, of very considerable interest in the light of more recent work that some of Camus's animals, which died later in a cachectic state, showed white spots in liver and spleen which Camus interpreted as evidence of secondary bacterial infection. He records, indeed, the cultivation of staphylococci from such spots. Congestion of the ovaries was noted by him, but he makes no mention of renal or pulmonary lesions.

The results of Camus's work, in so far as they concern the production of lesions in the neighbourhood of mucous orifices, have been fully confirmed (Uhlenhuth and Bieber, 1923; Watanabe, 1924, &c.).

Levaditi and Nicolau (1923) in their study of neurovaccine saw similar lesions to those described by Camus after intravenous injection of the virus. Their work was, in the main, directed to the recovery of virus from various organs with a view to securing evidence of affinity of virus to tissues of epiblastic origin, and in the course of this work they demonstrated the fairly constant presence of virus in adrenals, lung, &c. No naked-eye lesions in liver, lung, or adrenal were noted by them, but they describe and illustrate what they take to be microscopic inflammatory foci of vaccinial origin in lung, liver, and interstitial tissue of the ovary. Watanabe (1924), using glycerinated lymph and the intravenous method, demonstrated in rabbits the production of vaccine pustules about the face, as Camus had done, but his results are of special interest in that he noted the presence on the hairy skin of numerous small papules with hæmorrhagic centres. Histological examination of these papules revealed inflammatory reactions in the dermis only. Epithelium was not involved. These papules he believed to be caused by the virus. They did not appear when the virus was inoculated intravenously into immune rabbits. One of us (Ledingham, 1924) in the course of an investigation of the tissue affinity of vaccinia, inoculated the virus directly into the spleen. A specific lesion was produced locally, and a crop of secondary vaccine papules which were described and figured appeared on the serosa of adjacent coils of bowel. Similarly, when introduced into the peritoneum the virus gave rise to omental papules of like histological structure. It appeared, therefore, that vaccine virus of cutaneous origin had the capacity, if a somewhat feeble one, to produce lesions in abdominal viscera when directly introduced.

Our knowledge, however, of the generalising potentialities of the vaccine virus has been considerably increased by the experimental results recorded by Douglas, Smith, and Price (1929) working with potent doses of neurovaccine or neuro-testicular vaccine introduced by various routes. In addition to lesions about the mouth, nose, and eyes corresponding to the picture of Camus, and which were frequently accompanied by acute catarrhal processes, they describe and illustrate multiple lesions in the hairy skin and macroscopic foci in lungs, liver, adrenals, testicles, ovaries, mammary glands, spleen, and intestinal serosa. Though elicited with greatest constancy and intensity by the intravenous route, these visceral lesions were liable on occasion to follow intracutaneous, intracerebral, and intraperitoneal inoculations of neurovaccine. Douglas and his colleagues give no histological details of these visceral lesions. They state, however, that bacteriological examinations of various tissue lesions and fluids gave consistently negative

results and that, therefore, secondary bacterial infections might definitely be excluded from playing a part in the genesis of the lesions. McIntosh and Scarff (1929), who have encountered similar lesions by similar methods, also state that there was no evidence in their rabbits of the presence of secondary infections such as—e.g., pasteurella.

Some months before the paper by Douglas, Smith, and Price appeared, one of us (L.) who had had the advantage, through the kindness of Capt. Douglas of seeing these visceral lesions in the rabbit, and of studying the histology of casual specimens, commenced experiments with neurotesticular vaccine in order to secure some personal experience with this potent type of strain. It was soon noted that certain animals after intravenous inoculation developed acute catarrhal eye conditions, while other animals inoculated intradermally with the same virus presented characteristic lesions on adjacent areas of shaved skin. At later stages these animals also were liable to develop acute catarrh about the eye and nose. If such animals died or were sacrificed the remarkable picture described by Douglas, Smith, and Price was generally in evidence either in full or modified form. A very notable feature of this picture was the massive involvement of the uterine horns in pregnant females which at one time led to abortion and at another to death in loco of the fœtuses. The latter picture was especially noted at autopsies performed some two to three weeks after intracutaneous titration of neurotesticular vaccine on the shaved backs.

The successful cultivation of *P. lepiseptica* from the eye discharge in some of these cases, and from similar discharges in uninoculated stock rabbits during the winter months led one of us (L.) to put forward the suggestion, in the course of recent discussions on viruses, that in the genesis of these remarkable lesions latent bacterial infections stimulated to activity by the introduction of a potent vaccine virus, might play a part, and that the vaccine virus might not be solely responsible. Histological examination of visceral lesions and of tissues kindly lent by Capt. Douglas had revealed the presence of massive cell necroses (chromatin comminution) with little or no evidence of repair, and it became, therefore, a question how far it was possible to distinguish casual lesions of this character from those due—for example, to pasteurella organisms which are known to produce necrotic lesions in lungs and liver. Moreover, the not infrequent occurrence in uninoculated rabbits or rabbits inoculated with materials other than vaccinia, of casual discrete pearly spots in lungs and livers, required careful consideration in correctly appraising the visceral lesions following inoculation with neurovaccine. Such spots are often bacteriologically sterile, but they may, nevertheless, represent healed or healing granulomatous lesions due primarily to bacteria. Histological examination has shown that slight coccidial liver infections may, on occasion, take the form of quite small pearly foci liable to be confused with the miliary pearls described in the liver following the introduction of neurovaccine. These difficulties are illustrated below in discussing the histological features of the visceral lesions, and the point emerges clearly that the examination of successive stages in the evolution of the lesions can alone give confidence in interpretation.

The suggestion that organisms of the pasteurella group might possibly play a part was also strengthened by the experimental data of Pette (1928) who, in the course of an attempt to repeat the work of Lucksch, had the unusual experience of seeing rabbits, scarified or otherwise inoculated with lymph, die of acute pasteurellar infection. Examination of the nasal mucosæ of clinically healthy stock rabbits revealed pasteurellar infection in 10 per cent. of the animals.

Record of Authors' Experiments.

We propose here to place on record a brief series of experiments designed to determine whether such suggestion as to the origin of the visceral lesions was valid, and if so, to what extent; and, secondly, to give some details of the histology of these visceral lesions which are new to pathology. It may be said at once that the above-cited suggestion, based on the initial experiences, has received only a modified support from further work, and that the capacity of vaccine virus under appropriate conditions to produce widespread visceral lesions in rabbits must be frankly admitted.

The present bacteriological and histological study is based on two main sources of material:—

Source A.—Eight rabbits were inoculated intradermally in numerous spots over the shaved back in the course of titration of neurovaccine or of similar virus grown in contact with living cells. For this material we are indebted to Drs. Eagles and McClean. The following brief particulars are appended with regard to these eight animals:—

R.65: Conjunctivitis noted fifteenth day. Killed sixteenth day. Scattered foci in liver. *R.69*: Intradermal reactions feeble, but generalisation on skin noted seventh day, and conjunctivitis on twentieth day. Killed twenty-first day. Lesions in liver, lungs, and uterine horns. *R.70*: Intradermal reactions feeble. Conjunctivitis noted tenth day. Killed twenty-first day. Foci in ovary, uterus, liver, and lungs. *R.76*: Intradermal reactions feeble. No conjunctivitis. Dead on twentieth day. Pregnant, multiple lesions in uterus, ovary, kidney, and liver. *R.81*: Intradermal reactions strong. Skin generalisation. Dead on twenty-fifth day. Pregnant, massive necrotic lesions in uterus and multiple foci in lungs. *R.85*: Intradermal reactions strong. Emaciation ensued. Killed sixth day. Not pregnant. Numerous foci in spleen, liver, lungs, and adrenals, and a few in uterine horns. *R.73*: Intradermal reactions feeble. No generalisation. No conjunctivitis. Died after 60 days. Some white spots on liver and uterus *R.93*: Intradermal reactions normal. On this occasion pure dermal virus used. Killed on fourth day to secure passage material. Liver showed many pearly foci.

Source B.—Sixteen animals were inoculated intravenously or intradermally and intravenously with neurotesticular vaccine. Of these 16 animals 12 belonged to one series, all of which received the same dose of neurovaccine intravenously on the same day—viz., 2 c.cm. of a 1 in 10 dilution of a strain of neurovaccine which was capable of producing dermal reactions in a dilution of 1 in 1,000,000.

The weights (in oz.) and temperatures of these 12 animals before and after inoculation on July 2nd are shown in the Table. (+ = death).

It will be noted that eight animals died between the sixth and twelfth day. Apart from the picture described by Camus (pocks about the lips, nose, and eyelids) particularly intense lesions appeared on the ear employed for intravenous injection. The ear either showed a diffuse board-like thickening or more commonly the substance of the ear was beset with hard shotty papules. In one case only were shotty nodes observed in the opposite ear. At the autopsies of the fatal cases the picture was substantially that described by Douglas, Smith, and Price, but varied slightly in intensity in individual cases. Five of the animals had pocks about the mouth, tongue, nose, and eyes, but in two only was there an acute purulent discharge with keratitis. Slight mucoid discharges at the canthi were usually associated with the presence of a pock on the eyelid. In four of the fatal cases the skin of the back and the underlying fasciæ were beset with purpuric spots often confluent, the picture recalling strongly that met with in the skin of rabbits inoculated with an antiplatelet serum. The purpura was associated with considerable œdema of the dermal tissues, and the lymph glands of axilla and groin were of the red hæmolymph type. In these essentially hæmorrhagic cases lungs and other organs were beset with petechiæ. The bladder usually contained blood-stained urine, and in one case a large fresh blood-clot almost filled the vesical cavity. It should be noted also that the purpuric areas in the skin of the back contained no formed papules, death having taken place too early for these to develop.

Bacteriological Investigations.

During the months November, 1928, to April, 1929, when acute catarrh of eye and nose was liable to intervene at some period following intradermal or intravenous inoculation with neurotesticular vaccine bacteriological examination of these catarrhal discharges and of organs in which lesions were detected when the animal was sacrificed or succumbed were carried out by one of us (B.). It is unnecessary here to record the findings in detail, as in a few cases only were results of definite significance obtained. From the eye discharges of three of the earlier cases of the winter series, organisms corresponding in cultural and

biochemical characters with *P. lepiseptica* were recovered, while from five cases pasteurella-like organisms more closely resembling *Bacillus bronchisepticus* were obtained. From the nasal discharges of four cases *P. lepiseptica* was recovered in one case and from another a pasteurella-like organism. Representatives of this group were naturally searched for with special care in view of their association with snuffles in rabbits and their possible "activation" from latency by the inoculation of a potent virus. No evidence, however, was obtained of the presence of organisms of this group in organs showing lesions. When such organisms were present in an eye discharge but absent from an organ lesion it was not possible to exclude definitely participation of pasteurella if the lesion happened to be of some standing, as it is known that these organisms may be only with difficulty, if at all, recoverable from lesions in process of repair.

As we shall see later, the pearly lesions found in the livers of intradermally inoculated animals after a period of three weeks were usually of the granulomatous type. In no case was a blood invasion by *P. lepiseptica* demonstrated. On the other hand, in two cases in which cultivations were made from the as it recalled a former case in the experience of one of us in which a rabbit inoculated with calf lymph intradermally was found dead on the fourth day. From all its organs *B. anthracis* was recovered. No work on anthrax was in progress at the time.

Finally, with regard to the eight fatal cases of the tabulated series, in one case only (No. 14) was evidence obtained of a secondary streptococcal invasion. Heart bloods post mortem were usually sterile. From spleens, livers, and lungs only occasional contaminants, mainly of coliform or gelatin-liquefying types, were recovered. The freedom from secondary bacterial invasions exhibited by these early fatal cases gave the necessary confidence in interpreting the histological features of the visceral lesions. To this subject we now come.

Histology of the Visceral Lesions.

The histological features of visceral lesions following the introduction of neurotesticular vaccine by intravenous and intradermal routes have been studied so far in 22 rabbits—viz., (A) 8 fatal cases at six to twelve days after intravenous inoculation (see Table); (B) 4 rabbits similarly inoculated, but sacrificed between the sixth and sixteenth day; (C) 3

TABLE SHOWING COURSE OF TEMPERATURE AND WEIGHT AFTER INTRAVENOUS INOCULATION ON JULY 2ND. (12 RABBITS.)

No.	July 2nd		3rd		4th		5th		6th		7th		8th		9th		10th		11th	
	T.	Wt.	T.	Wt.	T.	Wt.	T.	Wt.	T.	Wt.	T.	Wt.	T.	Wt.	T.	Wt.	T.	Wt.	T.	Wt.
9	103·4	54	102·6	54½	105·6	55	104·8	56	105·8	—	103·4	—	<97	49	+		—	—	—	—
10	102·2	46	102	47	104·6	47	105	48½	105·6	—	105	—	103	47	103	46	103	45	102·6	43
11	102	47	102·2	48½	104·8	†	105·4	49	105·2	—	104·8	—	104	50½	103·8	48	103·2	46	102·4	43½
12	102·4	49	101·8	49	104	49	104·6	48	100	—	96	—	+		—	—	—	—	—	—
13	103	45	102·8	45½	104·8	49	105	48	106	—	104·2	—	102·6	43½	95·6	42	+		—	—
14	102·6	49	103	50	105·8	47½	105·2	49½	106·2	—	105	—	103·2	48	100·2	47½	97·8	44	+	
15	102·6	49	102·2	49	105	50½	105	48	103	—	100·4	—	95·4	41½	+		—	—	—	—
16	102	49	101·6	49½	105·6	49	105·2	48½	102·8	—	98·4	—	+		—	—	—	—	—	—
17	102	50½	102·2	51½	104·8	—	105	51	103·4	—	100·2	—	<97	46+	—	—	—	—	—	—
18	102·2	50½	102·2	53½	105·4	53½	105·2	54½	105·4	—	104·8	—	104·2	57½	104·6	56½	103·6	55	103	56
19	102·2	49	102·6	48	105·6	47½	105·4	49	105·6	—	104·6	—	104	46	104	45	103·8	43	102·2	41½
20	103·2	50	102·4	51	105·2	54	105·4	54½	106	—	105·2	—	105	56	105·2	54½	104	52	103	50½

No.	July 12th		13th		14th		15th		16th		17th		18th		20th		21st		27th	
	T.	Wt.	T.	Wt.	T.	Wt.	T.	Wt.	T.	Wt.	T.	Wt.	T.	Wt.	T.	Wt.	T.	Wt.	T.	Wt.
10	101·2	40½	97·8	38	+		—	—	—	—	—	—	—	—	—	—	—	—	—	—
11	101·4	41½	100·2	41½	100·8	43½	100·8	44½	102·2	37	101·6	50½	100·8	52	101·2	49½	100·2	50½	—	45½
18	103	56½	102	55	102	56	102	58	102·6	60	102·8	59½	101·6	62½	101·2	55½	101·8	58	—	59
19	99·6	38	99·8	37½	100·2	37½	100	37½	99	37½	98·8	41½	99	41	101·6	39	100·6	40	—	44½
20	101·8	49½	100·2	50	99·6	52	100·2	56	101	58½	100·6	57½	100·8	59	100·4	55	99·8	56½	—	61½

Weight in ounces. + = death.

intensely hæmorrhagic and œdematous dermal tissue characteristic of the dermal response to neurotesticular vaccine, and from adjacent generalised skin papules, an organism not yet identified, but culturally resembling *P. lepiseptica* was recovered in pure culture. While, therefore, in intradermally inoculated animals sacrificed about the third week no clear evidence of participation of bacterial infections in the visceral lesions was forthcoming, it was definitely established that secondary bacterial infections were a contributory cause of death when such animals succumbed as occasionally happened. In *R. 81* (see Source A) for example, which was found dead on the twenty-fifth day, all the organs examined contained pneumococci in pure culture, and sections revealed a massive invasion by these organisms. Doubtless the pregnant state coupled with the necroses of the uterine wall due to virus action predisposed to secondary bacterial invasion. In another instance evidence of bacterial invasion was obtained in a rabbit which was killed for histological study on the seventh day after intravenous inoculation of neurovaccine. Spleen films made immediately after sacrificing the animal revealed the presence of a Gram-positive rod, and a culture of an anthracoid organism was obtained, not only from the spleen but from uterus, liver, and lung. The colonies obtained were few in each case, and in all probability the organism was in process of dying out after a brief blood invasion. The circumstance is noted, however, rabbits, *R. 76*, *R. 81*, *R. 73*, intradermally inoculated and showing some evidence of generalisation at death on twentieth, twenty-fifth and sixtieth days; (D) 5 rabbits intradermally inoculated and sacrificed on fourth, sixth, sixteenth, twenty-first, and twenty-first days, *R. 93*, *R. 85*, *R. 65*, *R. 69*, *R. 70*; and (E) 2 rabbits sacrificed five months after an intravenous inoculation from which they did not appear to suffer. In addition, suspicious spots in organs of animals inoculated with various bacteria (pasteurella, anthracoid organisms, pneumococcus, &c.) have been examined for comparative purposes. It is proposed here to record the main features only, pending a fuller illustrated study to be published later.

Series A.—The most satisfactory material has been that obtained from the early fatal cases (see Table) in which there was no evidence that death was due to other causes than the virus. The four surviving animals of this series are being retained for study of possible late lesions.

Liver.—Multiple focal necroses of liver cells, showing, as a rule, evidence of initial hæmorrhage, is the prevailing lesion. These necroses are precisely similar to those met with in certain acute bacterial infections—e.g., spontaneous rat plague—and need no description. In those rabbits which died at the later periods (9–12 days) there was evidence of rapid replacement of necrotic areas by bile-duct proliferation.

Lung.—The feature here also is the presence of discrete or confluent areas of necroses of alveolar tissue accompanied by hæmorrhage. In the worst cases little healthy alveolar tissue may be left. Walls of blood-vessels and bronchi are

severely involved in the general necroses and there is little or no attempt at delimitation of the lesions by proliferation of adventitial cells of vascular sheaths. Where a hæmorrhagic necrotic focus is situated in the subpleural region, as frequently happens, a striking defence mechanism is afforded by the formation of a lens-shaped hyperplasia of the overlying serous endothelium. This structure is responsible for the raised macroscopic foci on the lung surface.

Ovary.—Lesions, when present, took the form of acute hæmorrhagic necroses, sometimes very extensive, in the interstitial tissue of the organ. There was no evidence of repair.

Spleen.—Isolated focal necroses in the pulp were noted in one case only.

Brain.—The animals had shown no symptoms pointing to cerebral disturbance during life. In three of the fatal cases, however, the brain was examined microscopically and showed no obvious lesions.

Adrenal.—In all the fatal cases of the series this organ presented focal necroses, discrete or confluent. As many as 25 discrete necroses have been counted in a cross section, so that the amount of functioning cortical tissue is greatly curtailed. The necroses are most commonly found in the mid cortex, but in two cases they have been noted in the medulla. The destruction of the adrenal cells is accompanied in the early stages by hæmorrhage, and considerable congestion of vessels is seen at the periphery of the lesion. In one case only (No. 10) which was the last to succumb (on the twelfth day) was there evidence of reaction on the part of the local reticulo-endothelial tissue. In this case the single large necrotic focus present was surrounded by a narrow zone of adventitial cells of plasmacytoid type.

Pocks on Skin of Back.—As noted above these lesions took the form of purpuric foci accompanied by œdema of the dermal tissue. Section of these areas showed massive necrosis with hæmorrhage of all vascular tissues in dermis down to the skin muscle, the bundles of which were also degenerate. There was no trace of repair.

Series B.—Of the four animals of this series (all older animals and weighing about 5 lb.) two were killed on the sixth and seventh days respectively, while apparently unaffected clinically by the intravenous dose, and the other two on the thirteenth and sixteenth days.

In one of the two former there were no necroses in liver, spleen, or adrenal, and only one fairly large focus in the lung section. Here, however, it was noted that the reticulo-endothelial tissue in the neighbourhood of the larger vessels and bronchi showed very marked proliferation, and that polynuclear cells were infiltrating the necrotic area. In the other animal the lungs contained numerous confluent necroses, but there was very definite reaction on the part of the vessel sheaths. These proliferated sheaths are striking objects in all vessels not completely necrosed. The liver also showed foci containing proliferated bile-duct epithelium, apparently replacing areas of initial necroses. Uterus and ovaries contained widespread hæmorrhagic necroses, but even at this early stage defence processes were in evidence. Ovarian and uterine necroses showed vast numbers of infiltrating polynuclears which were usually absent in the necroses of the early fatal cases, and there were numerous wandering macrophages with included polynuclears. Collections of the latter cells with their nuclei fused together in horseshoe form, and their granules massed in the centre simulated in a remarkable way the Langhans giant-cell. When the necroses underlay the serosa, the serosal endothelium was proliferated to form a dome of many layers.

The adrenal section presented four large necroses with many infiltrating polynuclears, but no ring of new reticulo-endothelial tissue. This case also was the only one of the series in which grey papules were present on the serosa of the *bowel wall*. The necrotic lesion here was confined to the serous coat and underlying tissue. The muscular coats were not penetrated. At the surface the serous endothelium showed great hyperplasia with many mitoses.

Of the two killed on the thirteenth and sixteenth days, one only presented both in lung and adrenal isolated necroses surrounded by proliferated adventitial and plasmacytoid cells.

Series C and D (with exception of *R. 85* and *R. 93*).—The lesions met with in these animals, particularly those affecting the liver, were at times difficult to interpret.

Only *R. 70* and *R. 81* presented necroses in the lungs. In *R. 70*, which was killed on the twenty-first day, the single large necrosis noted in the lung section was surrounded by proliferated reticulo-endothelial tissue, and there was evidence of formation of new alveolar columns. In *R. 81*, which succumbed to a pneumococcus infection, the lung showed many necroses and many polynuclears infiltrating the lung substance, but no reticulo-endothelial response.

In *R. 70*, *R. 81*, and *R. 73*, the adrenals presented necroses usually single, and surrounded by massive development of reticulo-endothelial cells.

R. 76, *R. 70*, and *R. 81* presented massive necroses in the walls of uterine horns extending to the mucosa, but there was already an attempt to delimit these areas by new reticulo-endothelial tissue. The small spot on the uterus of *R. 73* proved to be a granulomatous nodule of undetermined nature, attached to the serosa.

The scattered pearly spots observed on and in the livers of certain animals of this series and which, to the naked eye, corresponded tolerably well with those in the acute fatal cases, though fewer in number and of somewhat larger size, proved on section to be granulomatous areas with dense fibrous walls infiltrated with eosinophil cells. Occasionally enormous syncytial giant cells with many nuclei were present, and not infrequently a necrotic mass was present in the centre of the granuloma. We have come to the conclusion that all these spots represent some phase or other of the strange granulomatous foci known to be associated with coccidiosis, and that they have no relation to any antecedent vaccinial infection.

There is collateral evidence in support of this view. *R. 85*, which was killed on the sixth day after intradermal inoculation, presented similar granulomata in the liver with walls infiltrated by eosins. The adrenal section showed five necrotic foci round one of which there was already a new ring of reticulo-endothelial tissue. This case is of interest in that it demonstrates visceral generalisation so early as the sixth day after intradermal inoculation. Also in No. 16 (see Table), in addition to the multiple acute necroses in the liver, there were older areas containing *Eimeria stiedæ*.

The spots on the liver of *R. 93*, killed four days after inoculation intradermally with pure dermal virus, which is not known in our experience to have the property of generalising, were examined and found to consist of granulomatous masses containing remarkable giant-cell formations. Interlobular cirrhosis was present in the liver of this animal and in the livers of certain other animals of this series.

Finally, with regard to the two animals of *Series E*, which were sacrificed 143 and 165 days after an intravenous injection of neurotesticular vaccine, one of them showed an adrenal necrotic focus with massive development of new reticulo-endothelial tissue at its periphery. The giant-cell granulomata found in its liver were probably of coccidial origin. The other animal presented no lesions in liver or adrenal, but in the lung there were areas of massive perivascular infiltration containing occasionally giant cells of the fused nuclear type. No remains of initial necroses were seen, but the distribution of these areas might reasonably suggest a late stage in the healing of initial necroses. They appear to be identical with those figured by McIntosh and Scarff (1929) in a recent paper.

To conclude this section, it may be noted that spots simulating (to the naked eye) those met with in *Series C* and *D* have been found in the livers of animals inoculated with various bacteria. They cannot, however, be attributed to these experimental infections. For example, in animals inoculated intravenously with large doses of *P. lepiseptica* granulomatous areas have been present in the livers alongside the characteristic focal necroses due to the bacterial infection.

Discussion.

The observations we have recorded in this communication are in substantial agreement with those of Douglas, Smith, and Price, of McIntosh and Scarff (1929), and of Bijl and Frenkel (1929), whose paper dealing with the histology of visceral lesions following cutaneous vaccination of rabbits with neurovaccine appeared while these notes were being written. The suggestion for which one of us (L.) was responsible, that pasteurellar or other latent infection in rabbits might become active in response to the virus invasion and account for the lung and liver lesions has not been supported by the data here adduced. It is clear that the vaccine virus in the form of neurovaccine or neurotesticular vaccine is capable, in whatever site

introduced, of doing what cutaneous strains of virus are capable of doing only when introduced into the blood stream (picture of Camus). The "organ" virus has the further property of producing macroscopic lesions in many viscera.

It is remarkable that our present knowledge of the generalising properties of vaccinia has been reached so gradually. Camus attributed his successful results with cutaneous vaccine intravenously introduced to adequate dosage, and this factor is also of importance with neurovaccine. Young animals also would appear to be more responsive, as Douglas, Smith, and Price assert. Consideration of the histological features of lesions following neurovaccine does not suggest that the virus by passage through testis or brain or both has acquired new properties, but rather that it has become possessed in intensified form of properties shared also in a limited degree by strains of cutaneous source. The latter, when introduced into the dermis, will invariably produce some degree of necrotising action on vascular endothelium and reticulo-endothelial tissues generally, with consequent hæmorrhage. Introduction of neurovaccine into the dermis is followed on the other hand by widespread destruction of vascular tissue and widespread hæmorrhage. The diffusive uncircumscribed character of the skin reaction following intradermal inoculation of neurovaccine, with its peculiar purplish-black tint, is due to this, as histological examination shows. Increased endotheliotoxic or endotheliolytic powers, therefore, must increase not only the chance of invasion from a skin area, but also the strength of that invasion, and it is on the latter presumably that the production of actual visceral lesions will depend.

Reynals (1928) has shown that the addition of certain tissue extracts—(e.g., renal or testicular) to cutaneous strains of virus will very markedly enhance the dermal response following intradermal inoculation, thus rendering it very similar to that produced by neurovaccine. As neurotesticular vaccine can produce its characteristic skin reaction when employed in very high dilution, the "Reynals" factor is likely to account, only in a minor degree, for the enhanced virulence exhibited by strains which have been repeatedly passed through organs. That by repeated passage through a particular tissue a virus may acquire an increased power of proliferation in that tissue, and at the same time lose much of its power of propagation on the tissue on which it was originally propagated (scarified skin surface) has been shown by Ledingham and McClean (1928) in the case of virus propagated from dermis to dermis. This dermal virus, however, has never shown signs of generalisation either in skin or organs when implanted in a dermal area. Further research must elucidate the mechanism of these adaptations.

In the meantime it seems clear on general grounds that neurovaccine, while not apparently neurotropic, has nothing to recommend it as a form of vaccine lymph for human use. Bijl and Frenkel (loc. cit.) state that neurovaccine, which has been employed to some extent in Holland, involves a greater risk of postvaccinal encephalitis. So far, we have not seen the Dutch statistics on which this important assertion is based. It is freely stated, however, that the neurovaccine is liable to produce rather severe local reactions and to be followed not infrequently by generalised vaccinia. On the other hand, as Bijl and Frenkel remark, postvaccinal encephalitis is not known to be accompanied by generalised vaccinia in any form. Indeed, in the great majority of cases the vaccinations (with calf lymph) have run a normal course. There is the further fact that so far as our present knowledge goes, the brain is not involved in the generalised lesion syndrome (as distinct from simple virus invasion) following the introduction of neurovaccine in rabbits. Moreover, when neurovaccine is introduced directly into the brain of the rabbit, meningitis but not encephalitis is produced.

Huon and Placidi (1924) some years ago reported the occurrence of cerebral and paralytic symptoms in rabbits inoculated with a particular strain of lymph which had been propagated on asses. Death in coma was liable to occur on the fourth or fifth day, and vaccinal pustules were present on the tongue and buccal mucosa. A sample of this lymph, which had been kept in cold storage for some time, was kindly forwarded to one of us (L.) by M. Huon, of Marseilles, and tested on rabbits in London. The rabbits reacted normally to the virus, and there was no evidence whatever of cerebral disturbance.

Owing to its liability to spontaneous forms of encephalitis the rabbit has not proved a very suitable experimental animal for the investigation of problems concerned with the possible implication of the central nervous system in the syndrome that may follow the introduction into the skin of any form of vaccine virus. Though activation of latent bacterial infection has played no part in the production of the visceral lesions following introduction of neurovaccine, it is not to be assumed that such activation is a negligible contingency. The above-cited experience of Pette and many collateral data concerned with bacterial activations in the course of experimental avitaminoses show that the seasonal factor, as well as the degree of incidence of latent infection, are of importance. Moreover, there appears to be no doubt that for the occasional late deaths of rabbits following intradermal inoculation of neurovaccine secondary bacterial infections may be immediately responsible.

With regard, finally, to the visceral lesions and their histological features, perhaps the most interesting are those affecting the adrenals. For the early fatalities described in this paper the severe lung lesions and the widespread hæmorrhages were probably mainly responsible, but the equally severe necrotic lesions present in the adrenals suggest new clinical problems which it may be possible to attack experimentally. We have shown here that after five months such lesions may be demonstrable in process of repair. The experience of Douglas and his colleagues in connexion with pregnant female rabbits and the severity of the uterine lesions in such cases we fully confirm. As to the liver lesions, the vaccinial origin of the multiple focal necroses is not in dispute, but the greatest caution must be exercised in assigning a vaccinial origin to liver spots met with in animals sacrificed at later stages, though these may simulate in a remarkable way the naked-eye appearance of the acute necroses. It is probable that the true initial focal necroses in the rabbit liver become very rapidly replaced by new liver tissue in animals that are to survive.

Brief Summary.

(1) The observations of Douglas, Smith, and Price on the occurrence in rabbits of visceral lesions following the introduction of neurotesticular vaccine are confirmed. (2) These lesions are due to the virus and not to any latent bacterial infection activated by the virus. (3) Some account is given of the histological features of the visceral lesions, and attention is drawn to errors of interpretation that may arise in connexion with liver lesions of other than vaccinial origin. (4) Though not responsible for the visceral lesions, bacterial infections may intervene in the course of the cachexia produced by the virus, and may be responsible for a fatal issue. (5) The bearing of the new knowledge on some current problems is discussed.

References.

Bijl, J. P., and Frenkel, H. S.: Cent. f. Bakt. Orig. Abt. I., 1929, cxii., 412.
Calmette, A., and Guérin, C.: Ann. de l'Inst. Past., 1901, xv., 161.
Camus, L.: Jour. de Phys. et Path. gén., 1917–18, xvii., 244, 641.
Douglas, S. R., Smith, W., and Price, L. R. W.: Jour. Path. and Bact., 1929, xxxii., 99.
Huon and Placidi: Compt. rend. Soc. biol., 1924, xci., 308.
Ledingham, J. C. G.: Brit. Jour. Exp. Path., 1924, v., 332.
Ledingham, and McClean, D.: Ibid., 1928, ix., 216.
Levaditi, C., and Nicolau, S.: Ann. de l'Inst. Past., 1923, xxxvii., 1.
McIntosh, J., and Scarff, R. W.: Proc. Roy. Soc. Med. (Sect. Path.), 1927–28, xxi., 1; Jour. Path. and Bact., 1929, xxxii., 551.
Noguchi, H.: Jour. Exp. Med., 1915, xxi., 539.
Ohtawará, T.: Scient. Rep. Gov. Inst. Inf. Dis., Tokyo, 1921, i., 203.
Pette, H.: Münch. med. Woch., 1928, p. 207.
Reynals, F. D.: Compt. rend. Soc. biol., 1928, xcix., 6.
Uhlenhuth, P., and Bieber, W.: Zeit. f. Immun., 1923, xxxv., 311.
Watanabe, J.: Arch. f. Hyg., 1924, xcii., 359.

Public Health Services.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

THE following table brings out some remarkable contrasts in the 1928 statistics of three of our largest cities:—

Name of district and estimated (R.-G.) population.	Birth-rate.	Death-rates per 1000 of the population.					Death-rates per 1000 births.			
		All causes.	Tuberculosis.	Cancer.	Respiratory diseases with influenza.	Heart disease.	Infant and neonatal mortality.	Young child (1–5 yr.) mortality.	†Maternal mortality from childbirth.	
Glasgow .. (1,060,500)	22·3*	14·8*	1·22	1·35	2·7	1·9	107	39	64	8·3
Birmingham . (968,000)	18·1	10·9	1·00	1·36	1·7	1·8	65	30	25	3·8
Liverpool .. (866,000)	22·1	13·2	1·38	1·27	3·0	1·0	94	32	54	3·4

* According to the local estimate of the population the Glasgow birth-rate is 20·6 and the death-rate 13·7.

† The death-rates from puerperal sepsis alone were: Glasgow, 3·8; Birmingham, 1·9; Liverpool, 1·0; and the proportion of stillbirths to live births: Glasgow, 4·4 per cent.; Birmingham, 3·4 per cent.; Liverpool, 4·0 per cent.

Glasgow.

In this report Dr. A. S. M. Macgregor devotes special attention to the housing problem. The number of houses completed during the year ended August 31st was the highest for half a century—namely, 6885—and included 132 of two rooms, 4184 of three rooms, and 2238 of four rooms. There has also been much building beyond the city boundary. These operations, combined with slum clearance and rehousing, are causing a salutary redistribution of the population. In certain areas there are slight signs of a diminution of overcrowding, but a large volume of overcrowding is due to the occupancy of small houses by large families. The crux of the problem is the provision of houses within the competence of small wage-earners. The report of the supervising nurse-inspector, whose duty it is to visit the families transported from the slums to new houses, shows the extreme difficulty of her task. An effort has recently been made to provide a cheaper house, this type being known in Glasgow as the "intermediate house." In January, 1928, 972 three-roomed and 258 four-roomed houses of this type were available at weekly rentals of 12*s.* 6*d.* and 14*s.* respectively, inclusive of rates, and the corporation decided to let them to overcrowded families with a maximum income of £4 per week, but preferably with less. The director of housing is at an early date to submit the design of a three-roomed house to be let at 10*s.*, and Dr. Macgregor hopes this cheaper "intermediate" house will soon be available for families whose incomes are less than £3 per week, but whose needs are no less clamant than those with higher incomes. The Glasgow Corporation thought they had obtained power to restrict the rentals of farmed-out houses, but a legal decision has shown that it will be necessary to insert a special clause with this object in the next provisional order promoted by the corporation.

The first recorded outbreak of poliomyelitis in Glasgow occurred in 1928. The acute cases coming to the knowledge of the health department numbered 112 and there was usually a long delay between the date of sickening and the official discovery of the case, until the existence of the epidemic had been made known to the medical profession. During the first five months only 10 cases sickened; during June, 5; July, 16; August, 25; September, 28; October, 22; November, 5; and December 1. There was a tendency to grouping in areas, a feature noted in the Glasgow encephalitis outbreak of 1924. The disease showed no predilection for any social class; there were 58 males and 42 females affected; 82 cases occurred under 5 years, 18 from 5 to 10 years, 4 from 10 to 15 years, and 8 were over the age of 15. In two instances cases were associated—two infants living in the same tenement building sickened on July 28th and August 1st respectively, and there was a group of six cases in the junior classes of a day school. There was no evidence of abortive cases, but Dr. Macgregor points out that such evidence is much more difficult to obtain in a town than in a rural area. In 79 per cent. of the cases paralysis appeared within seven days of onset; eight cases ended fatally—four on the third day, three on the fourth day, and one on the fifth day of illness. As regards the relation of these nervous diseases to influenza Dr. Macgregor shows the relationship of encephalitis epidemics to previous influenza epidemics, and points out that the influenza epidemic of January to February, 1929, was preceded by this poliomyelitis outbreak and associated with a concurrent outbreak of cerebro-spinal fever.

The discrepancy between the local and the R.-G. population is now 86,608, and makes an appreciable difference in the birth- and death-rates. There were 23,649 births and 7082 mothers attended the prenatal clinics. The mortality from puerperal sepsis—namely, 3·8 per 1000 births, was the highest ever recorded. 692 cases of ophthalmia neonatorum were notified, but no damage to sight was recorded among the survivors.

Birmingham.

Dr. H. P. Newsholme reports many improvements in environmental hygiene. The hydrographical survey of the river Trent has been continued. The waters of the river Tame have been remarkably clear, but there has been no appreciable increase in the oxygen content. Small fish have, however, been observed in the river in the Witton area of the city. There has also been a big improvement in the oxygenation of the upper river Tame. An increasing number of authorities are favouring the principle of admitting liquid trade-waste into the sewers, and in one instance at Bilston the admission of this waste has actually improved the standard of purification. Several firms have constructed settling tanks, and in one instance the recovery of the oil has more than compensated the firm for the expenditure incurred. The Birmingham Tame and Rea Board is increasing its bio-aeration installation from a capacity of 7½ to 20 million gallons. The policy of abolishing tipping has been continued, and the percentage of refuse tipped has been reduced from 34 in 1924 to 10 in 1929. The percentage of standard dust-bins is now 99. A new scheme has been introduced for converting vegetable refuse, which is incombustible and especially liable to cause a nuisance if tipped, into a fertiliser. New by-laws have been drafted for that very unsatisfactory class of dwelling known as houses let in lodgings. An attempt was made by a local Bill in the spring of 1929 to obtain powers to restrict excessive rentals in these premises. Though the gravity of the abuse was not denied, the clause was rejected on the grounds that general and not local legislation was needed to deal with the problem. The new houses built numbered 4992, of which 3505 were municipal. There is still a considerable shortage which makes it difficult to close and demolish unfit houses. Houses with only a short lease of life have, therefore, to be repaired as an alternative to closure.

The examination of pasteurised milk shows that the "positive holder" gives better results than the "flow retarder" type, and that there is extreme variation with high bacterial count in the case of the "flash-point" type. The prices per pint of graded milks are given as: Certified, 5*d.*; Grade A (T.T.), 4½*d.*; Grade A, 4½*d.*; Grade A pasteurised, 4*d.*; Pasteurised, 4½*d.* The cows in the city sheds at the end of the year numbered 1532, and amongst them 19 were dealt with under the Tuberculosis Order—viz., 8 with tuberculosis of the udder, 9 with

"emaciation," and 2 with "chronic cough, &c." Of 1056 samples of milk examined 9·1 per cent. were found to be tuberculous as compared with 7·1 per cent. in the previous year. The 1056 samples included 77 from city dairies of which 5, or 6·1 per cent., were infected. The local scheme for encouraging tubercle-free herds does not progress. At the beginning of the year the scheme included 21 herds with 713 cows. Two new herds came in, but four were withdrawn owing to the high percentage of reactors. At the end of the year there were 19 herds with 688 cows in the scheme. Of 1774 cows tested in connexion with the scheme 1546 passed, 213 failed to pass, and 15 were doubtful.

The general death-rate, the infant mortality-rate, and the birth-rate were the lowest ever recorded. The average general death-rate for the central wards was 14·0, for the middle ring 10·8, and for the outer ring 8·7. The death-rate from respiratory diseases was for the central wards 2·43, for the middle 1·55, and for the outer 0·99. There were 54 known cases of small-pox with one death. Most of the cases were in connexion with a poor-law institution. There were 1552 notifications of diphtheria with 70 deaths, and Dr. Newsholme says it is obvious from a review of the cases that bad housing conditions, overcrowding, and insanitation play a large part in its propagation. It is not infrequent to discover several children at one and the same time occupying the same room all suffering from diphtheria. A disturbing feature is the insidious onset causing delay in obtaining medical advice. A circular has been issued to medical practitioners asking them to administer antitoxin in doubtful cases without waiting for the result of the swab examination.

Some increase in the prevalence of dysentery due to an organism of the Flexner type is reported. There were 34 known cases. An outbreak affecting nine children occurred in the ward of an institution. Another outbreak of 16 cases occurred in some houses let in lodgings and was attributed to an ex-soldier carrier. One affected child of 2 years, who was in a debilitated condition previous to infection, died. Two families were affected by food poisoning. In one case the infection was due to *Bacillus aertrycke*, and the vehicle of infection was "à la mode" beef. In this case there were two patients and one death. The beef had no objectionable odour or unpleasant taste. In the other family there were two deaths and the medium of infection was thought to be "pig scratchings" or black puddings. The diagnosis of encephalitis lethargica was confirmed in 41 cases. Twenty-three were males with 13 deaths and 18 were females with 9 deaths. The problem of post-encephalitis still remains one of urgency, and these unfortunates "drift as in-patients or out-patients from one hospital to another leading a life of continual misery." There is no substantial difference in the rate of infant mortality during the first fortnight after birth in the central, middle, and outer wards, and the same observation is applicable to the stillbirth rate.

A special inquiry into deaths from pneumonia in children under 5 years by Dr. Ethel Cassie brings out the fact that the common type of pneumonia seen in young children is dependent to a great extent on environmental conditions. Another striking point is the high incidence of bad health and especially of pulmonary tuberculosis among the parents of the affected children. The training course for health visitors established jointly by the University of Birmingham and the public health committee in the autumn of 1927 has proved most successful in encouraging a supply of properly trained health visitors for the district. The number of ultra-violet light clinics has been increased from five to nine, and 1375 children and 21 mothers received the treatment. The number of expectant mothers who made use of the medical help insurance scheme was 3068, and medical help was sent for in rather more than a third of the cases. The cost to the corporation works out roughly at 18*s*. per case for both insured and uninsured.

Both the incidence of ophthalmia neonatorum and the damage resulting from this infection were heavier in 1928 than in any recent year. There were 530 notified cases as compared with 409 in 1927. Of the affected infants 18 had scarred eyes, and of these four were rendered quite blind, three had grave impairment of vision in both eyes, and 11 had permanent damage to one eye, the sight being completely lost in three cases. The factors responsible for this increase in the incidence and the severity of the disease are discussed. There was coincidently an increase in both male and female cases attending the V.D. clinics for gonorrhœa. No changes have been made in the prophylactic precautions adopted against ophthalmia or in the hospital provision for the cases which occur. "The majority of the patients received out-patient treatment until or unless there was clearly need for in-patient treatment," and the experience of 1928 seems to indicate as stated in the report that "early and prompt admission to a hospital bed for all but the mildest cases is therefore to be recommended."

Liverpool.

Dr. A. A. Mussen reports that the city boundary was extended on April 1st, 1928, to include the parishes of Croxteth Park and West Derby. The area of the city has thus been increased from 21,219 to 24,772 acres.

The building of the new abattoir has been begun. The subsidy houses erected during the year were 2339 municipal, and 298 by other enterprise. In 1919 the Housing Committee began to erect houses in the suburbs, and up to the present 17,432 and 169 flats have been completed and 747 houses are in progress. The difficulty with regard to the removal of insanitary houses in the congested part of the city will be lessened by the erection of 260 tenements (in progress) in Melrose-road and 198 in South Hill-road, Dingle (completed). The Queen Anne-street area has now been approved. This site consists of 5¾ acres, upon which it is proposed to erect 408 houses, which will form another addition to the sanitary dwellings in the central area.

At the end of the year influenza deaths began to increase, the prelude to the most serious visitation of influenza since 1918–19. The pandemic began on the western seaboard of the U.S.A. in October, 1928, and reached its height on the Pacific Coast on Dec. 8th. A fortnight later it reached the Eastern seaboard and appeared in Glasgow on Jan. 12th. Shortly afterwards Northern Ireland and the continent were attacked. The epidemic definitely began in Liverpool in the third week of January and reached its height in the week ended Feb. 2nd, when the general death-rate was 37·8. Liverpool was fortunate in getting the epidemic over before the really severe weather, and suffered less than many other large towns. Room was made for the numerous pneumonia cases in the poor-law hospitals by the transference of other types of disease to the city hospitals. During the first quarter of 1928 there were two cases of small-pox. One attended a doctor's surgery and was promptly isolated; the other case was a child in a gipsy caravan. There was no further spread, and Dr. Mussen points out that the child population of Liverpool is relatively well vaccinated. During the year the city arranged with 12 adjoining local authorities to treat their small-pox cases in return for an annual retaining fee and an additional payment per case admitted. There were seven Liverpool cases of anthrax, four among handlers of hides, one of a female who had to handle East Indian wool, and two among tanners' labourers. During the past five years striking results have been obtained at the City Hospital, Fazakerley, by serum treatment; 31 cases treated all made a good recovery without the excision of the malignant pustule. During the same period three moribund cases were taken in and died within a few hours of admission. Of the two 1928 cases, which ended fatally, one was diagnosed too late and the other by his own neglect was admitted to hospital too late. Steps have been taken to inform the

Liverpool hide and skin trades of the successful results of the serum treatment. A bull suffering from anthrax was slaughtered in Cheshire and the carcass sent to the Liverpool abattoir. The Cheshire butcher who dressed the carcass was seriously ill for some weeks. Those who handled the meat at the Liverpool abattoir received preventive doses of the serum and remained well.

Good results are claimed for light treatment at the Carnegie centre and at the Children's Hospital for non-pulmonary tuberculosis, Leasowe; and the medical staff who treated tuberculosis at Fazakerley Hospital are convinced that "light treatment is of very definite value." All degrees of inflammation were included in the 545 notifications of ophthalmia neonatorum. The damage done included one blinded child and one with the sight of the right eye affected. The total births numbered 19,120 and 8702 expectant mothers attended the 28 prematernity clinics, which are held weekly in Liverpool. Dr. Mussen complains of the delay in notifying tuberculosis; 22 per cent. of the pulmonary cases notified died before the end of the year, and 216 of the 1148 deaths from tuberculosis were those of unnotified cases. The attendances of gonorrhœa cases at the Seamen's Dispensary have been much reduced, as a shorter time is required for cure and irrigations since the installation of electrical treatment apparatus.

The transport of milk by motor vehicles on the road is increasing and has many advantages. Thus the farmer has his empty churns returned direct to the farm and the dairyman is saved the expense of collecting his milk at the railway station. During 1928 there was a considerable increase in the quantity of designated milk. The cow population of Liverpool is 3947, and amongst them 25 cows with tuberculous udders were found. 488 samples of outside milk were examined and 34, or 6·9 per cent., were found to be infected with tubercle.

SCHOOL MEDICAL SERVICE.

—	No. on roll.	Average attendance	Routine inspection.	Special exams. and reinspections.	Percentage of defects.
City of Liverpool	Not stated.		45,110	61,757	18·3
City of Nottingham	40212	35,938	10,610	32,597	20·7
Cambridge	6924	6266	2141	2335	10·6
Scarborough	Not stated.		1541	995	17·0

Liverpool.

THE immense improvement in physique and general health brought about at least partially by the activities of the school medical service is strikingly demonstrated in this report.

Dr. A. A. Mussen quotes from a report on the condition of the Liverpool school-children in 1907 descriptions of malnutrition, ill-clothing, and physical defect which seem incredible to-day. Dr. Mussen also reproduces statements from two head teachers, whose long experience enables them to recall the state of the children 20 years ago when teaching in a slum school was repulsive to many because of the dirt and its results. Quite half the boys were barefooted, and the teacher recalls the picture of "older boys carrying on their backs little chaps unable to walk because of festering sores on their feet." Another telling picture of the improvement is a graph showing the fall in the exclusions for verminous conditions, from over 950 in 1910 to under 20 in 1928. Dr. Mussen mentions some of the facilities now established for dealing with school-children, including residential open-air treatment in the committee's own institution at Woolton Vale, and the 30 beds reserved at Torpenhow, adding that there will be soon two new day open-air schools in the city. He makes special mention of the extensive and beneficial work carried out by the Committee's Inspector of Physical Training, the report of which appears as an appendix.

The care of pre-school children is now recognised as essential, and in 1927 arrangements were made for their treatment when suffering from otorrhœa or squint. Parental ignorance prevents more extensive dental treatment, the proportion of parents accepting treatment being less than three-fifths of that for the whole country. The charge (6*d.*) may have been responsible in some cases and the extension of free dental treatment is worth considering. But ignorance is the real difficulty in this matter and also in connexion with the refusals of the facilities afforded in the stammering class. In another connexion difficulty is caused by the mental attitude of the children themselves; 34 per cent. of those who had been provided with glasses were found not to be wearing them, the proportion rising to over 50 per cent. in certain schools. Often these children are afraid of ridicule. However, the marked change of attitude of parents and children to school medical work noted in Dr. Mussen's introductory pages will no doubt extend and the early removal of the obstacles still in the way of complete success can be anticipated.

Nottingham.

The earlier pages of the report by Dr. E. M. Wyche are taken up by photographs of facilities for treatment and examples of the fine results. Soon after comes a diagram showing the comprehensive scheme for diagnosis, treatment, and care, and the introduction to the text of the report shows how this organisation has been gradually built up. Among the more recent extensions is the orthopædic scheme dating from 1925. Two gaps remain in this work; the lack of a special school for the 377 cripples still in elementary schools, and the difficulty in securing enough beds for orthopædic cases; this latter difficulty is likely to be obviated shortly, when the new Harlow Wood Orthopædic Hospital is completed. An apparatus for ultra-violet ray therapy was installed in 1927, and an interesting account is given of the benefits obtained in certain cases. Plans are under consideration for a large open-air recovery school, a new minor ailment clinic, and an additional special school for 160 mentally defective children. Except for a school for physical defectives, which is lacking, there will soon be almost complete arrangements for care and treatment in the city, where, moreover, the value of the clinics is being increasingly realised by the private practitioner. A scientific study of the problem of mental deficiency made by Dr. A. A. E. Newth suggests that bad scholarship, poverty, and large families tend to be associated.

Cambridge.

The percentage of defects found at routine inspections in Cambridge is below the average for the country and so are the numbers of some of the groups of exceptional children. In any district this circumstance may be due to fortunate local conditions or to variations in the standard of ascertainment of defects. This year's figures are not quite so low as those of previous years. Dr. A. J. Laird attributes the increase to the larger number of children suffering from enlarged tonsils, adenoids, anæmia and debility, due, in his opinion, to the recent increased prevalence of measles, scarlet fever, and diphtheria. The general physique of the Cambridge children is very good and is still improving, but the number of delicate children (397) is very high, so that there was ample justification for the provision of an open air school in July.

The dental scheme, under the direction of Mr. W. Baird Grandison, is so thorough that every elementary school child in Cambridge has the opportunity each year of dental inspection and treatment, and in 1928 out of the 6266 children in average attendance, 6080 saw the dentist and 2996 received treatment. As a result of good work extending back for 21 years, the dental condition of the children has steadily improved. 34 per cent. of them had, this year, no decay in either dentition and there was an average of only 4 unsaveable permanent teeth among batches of 100 children. 886 children took no advantage of the facilities

offered. Mr. Grandison thinks that this was due, not so much to antagonism or ignorance as to inconvenience—for example, the mother might find difficulty in accompanying the child at the time appointed.

With such figures as 94·9 of sound temporary teeth after treatment, those responsible may be gratified by the success of the Cambridge dental scheme.

Scarborough.

DR. S. FOX LINTON introduces a detailed report by Dr. Anne Roxburgh. Scarborough is a town with rather a small child population, and there are some fortunate local circumstances and energetic social workers. The small numbers have perhaps been the reason for the absence of special schools; accommodation has been found for several defective children in institutions belonging to other authorities. There is no open-air school, nor is it deemed so essential as in the large and industrial towns; but for playing fields a piece of ground has been levelled on the Castle Hill and a large field has been rented by the Education Committee on the Northstead estate. The authority does not provide spectacles gratuitously; help is given to the poor children by the Amicable Society, often repaid by the parents in small weekly amounts. This Society also supplies cod-liver oil, milk, and free meals when needed. There are few cripples, so that an extensive orthopædic scheme is not wanted; but a clinic is held at the local hospital, attended by the orthopædic surgeon, Dr. H. L. Crockatt, and a massage sister. Institutional treatment is obtained when required at the Kirbymoorside Orthopædic Hospital. Cases of chronic deformities, such as those produced by old infantile paralysis under treatment by private practitioners or at the hospital, may need massage. This the poor can obtain by the help of the Council of Social Service, the parents paying what they can towards the cost.

Some at least of the reduction in the number of infantile deformities may be due to the activity of the infant clinic, where the health visitor has the assistance of a strong body of voluntary workers; several cases of early rickets are at present under treatment there. Another factor for good is doubtless the nursery class, at which the infants are kept under close medical supervision. X ray treatment for ringworm will be provided by a private arrangement with a skin specialist in the town.

Though there is no special M.D. school, there is a really adequate class for dull and backward, under a specially trained teacher, who has this year been given an assistant. A Council of Social Welfare, working in conjunction with the Yorkshire Association of Mental Welfare, takes over the after-care of children leaving this class. While in many branches of the work the ordinary official methods have not been developed, keen unofficial agencies have creditably filled the gap.

MENTAL HOSPITAL REPORTS.

THE 132nd report of *The Retreat, York*, records the gratifying fact that during the year 1928 over 69 per cent. of the patients admitted came as voluntary boarders, and the medical superintendent concludes that the era of the certified lunatic is drawing to an end. On Dec. 31st there were 210 patients on the books, the number of admissions (126) being the highest on record. The recovery-rate was 25 per cent., which is a high figure for the standard in use. A patient is only put in the "recovered" group when he is adjudged fit to resume his ordinary occupation without further supervision. The death-rate was 8·2 per cent. The general health was good, except for an outbreak of very mild paratyphoid fever which affected six patients and one nurse. A house was taken at Whitby for the summer months, and was much appreciated. The further development of occupational therapy is being considered, and every effort is made to induce the patients to share in their own entertainment. Fifteen patients have parole outside and 34 inside the grounds. The main part of the building had to be re-roofed last summer; the slates taken away were the original ones put on in 1793. Fourteen male and 20 female nurses are certificated in mental nursing; a sister, who was appointed matron of the Gloucester County Mental Hospital last year, was the seventh Retreat official to be promoted to a matron's post within six years.

James Murray's Royal Asylum, Perth, published its 102nd annual report for the year 1928–29. Ninety patients were admitted during the year—a record number—and the total on the books on March 31st was 192, an increase of 55 in four years. This increase has severely taxed the accommodation of the hospital, and a self-contained and detached reception block for 40 patients is to be built. The beds will be about equally divided between private rooms and dormitories, and the block will have its own nursing and domestic staff. There will be a surgery and dental room, clinical rooms, a laboratory, facilities for hydrotherapy and continuous baths, and an electrical treatment room with X ray apparatus and ultra-violet lamps. Acute cases will be sent to this block. The building has been so planned that another one like it can be erected near by in a few years if need arises. Many of the patients—over 62 per cent.—were admitted on a voluntary basis, and of these rather more than two-thirds were able to leave hospital restored or improved. Only about half the certified patients were discharged recovered. One general paralytic, treated by malaria followed by intensive antisyphilitic medication, has now been managing a successful business for 18 months. The death-rate was 9 per cent., and post-mortem examinations were made on half the fatal cases. The staff suffered a good deal from sickness during the year, but the hospital was remarkably free from epidemic disease despite the severe weather; there was only one case of influenza and no tonsillitis. A long series of patients was treated by protein shock and another series by ovarian extracts, but the results were confused and uncertain, as were also the results of ultra-violet therapy. Septic foci have been sought and treated, and a number of urinary antiseptics were tried. The occupational therapy department was attended by a great many patients; rug-making, basket-work, leather-work, and wood-carving all attract much interest. Open-air treatment is extensively used. The dairy herd has been disposed of; the fruit and vegetables did fairly well. A good deal of renovation has been carried out, and old-fashioned casements have been replaced by large panes or vita-glass. In January the carriages were replaced by a 24-h.p. seven-seater Austin limousine. Nine nurses sat for the R.M.P.A. certificate and were all successful, but there is a dearth of candidates for the State certificate.

At the beginning of this year there were 668 patients in the *City of Cardiff Mental Hospital*, an increase of ten on the previous year. The death-rate was 9·26 per cent. and the recovery-rate 38·7 per cent. The general health was good; there were three cases of tuberculosis, three of erysipelas, one of scarlet fever, and one of paratyphoid B. General paralysis was the cause of 34·84 per cent. of the deaths. Autopsies were held in all cases in which permission could be obtained. The dental surgeon has attended regularly throughout the year; the gynæcologist has examined 32 patients and the aurist 53. A wireless set has been installed; its cost was largely borne by members of the Japanese Community in London, in recognition of the care of certain Japanese patients in the hospital. The out-patient clinic in psychiatry is held weekly at the Cardiff Royal Infirmary, and the secretary attends there to follow up discharged cases. Various physiological tests are carried out on all suitable new patients, and investigations are being made into the condition of the vegetative nervous system, the blood cholesterol and hydrogen-ion concentration, and the carbon dioxide combining-power of plasma.

All but three of the male wards are nursed by women. Three nurses and one attendant passed the final State examination during the year.

There were 1081 patients in the *County and City of Worcester Mental Hospital* at *Powick* at the end of 1928. The recovery-rate for the year was 32·6 per cent. and the death-rate 4·7 per cent., the principal causes of death being old age (26 per cent.), heart disease (20 per cent.), and phthisis (12 per cent.). Autopsies were held on 68 per cent. of cases. Apart from a mild epidemic of influenza in the spring, the general health was good. Only six patients, all men, have parole beyond the estate; 32 men and seven women are free within the grounds. A dentist visits the hospital once a fortnight. The farm showed a profit of over £600 on the year's working, but does not supply enough milk for the needs of the institution. The visiting commissioners express anxiety about the use of nearly 200 twelve-ounce tins of condensed milk weekly, especially as margarine and not butter is given for breakfast and tea. The hospital is handicapped by having no electricity and very few clinical rooms. The committee is considering the introduction of an electric supply. One male and two female nurses gained the R.M.P.A. certificate during the year.

The report of the *Brighton County Borough Mental Hospital* at *Hayward's Heath* has as frontispiece an aerial photograph of the institution. There were 895 patients in the hospital at the end of 1928. Forty-five of the 264 admitted were over 60 years of age, and the recovery-rate was therefore a little lower than last year—36·6 per cent. The death-rate was 9·15 per cent. Twenty patients suffered from tuberculosis, but otherwise the general health was good. Eight general paralytics were sent to Hellingly for malarial treatment, but only one showed any improvement. Forty-six patients have been on full parole and 52 more on parole within the grounds. The hospital is crowded during the day, and the committee are considering the purchase of a neighbouring estate for an admission hospital. The dentist attended 685 patients during the year and extracted 757 teeth. One ward on each side is administered on the open-door principle. Ultra-violet ray treatment has been found valuable for convalescents. The out-patient clinic at Brighton served 438 patients, including 98 new ones during the year, and has done very good work. Four nurses obtained their R.M.P.A. certificate, and it is hoped that improvements in accommodation for the staff will diminish the matron's difficulty in securing suitable female nurses.

The *West Sussex County Mental Hospital (Graylingwell, Chichester)* had 877 patients on the books at the end of 1928, an increase of 65. The hospital is already uncomfortably overcrowded, and another two years must elapse before the new buildings will be available. The provisional scheme includes a block for 115 women, a villa for 50 women, an admission hospital for 35 women, and a nurses' home. Meanwhile the heating system of the old blocks is to be modernised. The medical superintendent hopes that the new admission hospital will, by the time it is ready, be allowed to receive patients on a voluntary basis. The death-rate was 6·1 per cent. and the recovery-rate 32·7 per cent. The general health throughout the year was good. There was one case of severe chicken-pox and a few cases of influenza. Two patients and the medical superintendent contracted typhoid fever. Five major operations were performed and one general paralytic was sent to Knowle for malarial treatment, but he did not improve. During the summer the usual picnics to the seaside were arranged. Several patients have been allowed out on leave for periods varying from a day to three weeks and parole beyond the estate is given to 23 patients, and within the grounds to 50 more. Three male and five female wards are administered on the open-door principle. Two nurses and one attendant obtained their R.M.P.A. certificate and one nurse passed the final State examination. The medical superintendent mentions the excellent work of the nursing staff in the face of peculiar difficulty incident to the overcrowding.

INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED AUGUST 24TH, 1929.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 139 (last week 120); scarlet fever, 1678; diphtheria, 793; enteric fever, 89; pneumonia, 490; puerperal fever, 40; puerperal pyrexia, 95; cerebro-spinal fever, 8; acute poliomyelitis, 14; acute polio-encephalitis, 3; encephalitis lethargica, 24; dysentery, 6; ophthalmia neonatorum, 110. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the Metropolitan Asylums Board on August 27th–28th was as follows:—Small-pox, 144 under treatment, 24 under observation (last week 147 and 1 respectively); scarlet fever, 1313; diphtheria, 1430; enteric fever, 14; measles, 325; whooping-cough, 228; puerperal fever, 26 (plus 11 babies); encephalitis lethargica, 123; poliomyelitis, 1; "other diseases," 20. At St. Margaret's Hospital there were 14 babies (plus 8 mothers) with ophtha'mia neonatorum.

Deaths.—In the aggregate of great towns, including London, there was no death from small-pox, 3 (0) from enteric fever, 18 (5) from measles, 3 (1) from scarlet fever, 24 (2) from whooping-cough, 20 (3) from diphtheria, 67 (11) from diarrhœa and enteritis under two years, and 17 (2) from influenza. The figures in parentheses are those for London itself.

Of the deaths from diarrhœa 7 each were reported from Liverpool and Hull, 6 from Birmingham, and 4 from Sunderland. Liverpool recorded 5 deaths from whooping-cough and Manchester 3. The deaths from enteric fever occurred at Wood Green, Sheffield, and Cardiff.

The number of stillbirths notified during the week was 259 (corresponding to a rate of 37 per 1000 total births), including 55 in London.

IRELAND.

(FROM OUR OWN CORRESPONDENT.)

A Memorial to Sir William Thompson.

A MEETING of the friends of the late Sir William John Thompson has been held to consider the establishment of a memorial to him. The meeting decided to appeal for funds to establish a tuberculosis village settlement in connexion with the Peamount Sanatorium, Co. Dublin. Sir William was greatly interested in anti-tuberculosis work and was, indeed, one of its pioneers in Ireland. He had been honorary treasurer of the Peamount Sanatorium since its foundation some 17 years ago, and had been interested for some time in the project of adding to its utility by a tuberculosis settlement. If adequate funds are forthcoming no doubt the Papworth model will be followed, and the Memorial Committee arranged with Dr. Varrier Jones to give a lecture a few days ago on his work at Papworth. At the sanatorium he addressed a large audience, including many of the patients, and having described the object and achievement of Papworth, he showed a large number of illustrative lantern slides.

Examination of Milk.

The difficulties arising in the examination of milk in regard to the amount of fats present were exemplified in two cases which came recently before one of the Dublin magistrates. A milk-dealer was prosecuted by the Dublin Corporation on the ground that certain milk offered for sale contained only 2·7 per cent. of fats, the legal standard being 3 per cent. Evidence was submitted, in defence, of a finding of 3·67 per cent. of fats in another portion of the same specimen. The magistrate adjourned the case for the report of the State analyst on the third portion of the specimen. His examination found 4·9 per cent. The magistrate dismissed the case with costs. In a similar case the three analyses gave percentages of 2·4, 3·59, and 6·7. This case also was dismissed with costs.

SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

Investigation of Maternal Mortality.

THE Department of Health for Scotland has taken an important step to secure the closer investigation of maternal deaths during pregnancy or within a month after the termination of it. This was one of the many recommendations made by Lord Salvesen's Committee on Puerperal Morbidity and Mortality, which reported to the Scottish Board in 1924. Why it should have taken five years to give effect to the recommendation may not be easy to explain, but the new department has lost no time in creating the necessary machinery and in issuing instructions. The form of death certificate in use in Scotland has now, under the powers of an Order in Council dated June 8th, 1929, been altered "to provide for a statement by the medical attendant if, in the case of a married woman, the death occurred during pregnancy or within four weeks of the termination of pregnancy." The Registrar-General for Scotland has notified the alteration in the certificate to the local registrars and authorised them to supply medical officers of health, when requested to do so, with a special return in a prescribed form in respect of cases in which the question as to pregnancy is answered in the affirmative. Registrars will be prepared to make these returns from Oct. 1st next. The second difficulty is the question of method. Fortunately, Aberdeen's ten years' systematic investigation (published by the Scottish Board of Health last year) provides a model and the Department now issues an elaborate form and a memorandum of directions to every medical officer of health. This is the most important step yet taken in Scotland to get to grips with the causes of deaths associated with pregnancy. There is every hope that practitioners will cooperate as they did in Aberdeen, since every care is taken to keep the investigation of individual cases strictly confidential.

Mental Defectives and the Public Safety.

At a Glasgow sitting of the High Court of Justiciary, a plea of insanity in bar of trial was accepted on behalf of a young seaman charged with shooting and murdering a woman in a Glasgow public-house. But insanity was not the whole case. Dr. Gilbert Garry, Duke-street Prison, considered the prisoner of unsound mind and unfit to plead; he did not appear to appreciate the difference between right and wrong. Dr. J. H. Macdonald, of Hawkhead Mental Hospital, regarded him as a moral imbecile and insane. Dr. R. D. Clarkson, under whose charge he had been at the Royal Larbert Institution, said the man had no sense of moral obligation and that he (Dr. Clarkson) had, without effect, recommended that his detention at Larbert should be extended. He had examined the man that day and found him in the same mental condition as when he was a boy. He declared that the accused, for the protection of others, should have been placed under proper supervision and control from the time he was 8 or 9 years old right through his life.

The Lord Justice-Clerk (Lord Alness), who tried the case, made some observations on it at an informal banquet given by the Lord Provost and magistrates. It raised the question, he said, whether adequate machinery existed for preventing persons being at large in the community when their mental state rendered them a danger both to themselves and to others. In this case an individual was found to be of unsound mind and unfit to plead. He was also described as having been in the same mental condition when released some time before from a mental institution. In that mental state, apparently, he went about the world, with the result that he shot a young woman dead, and attempted also to shoot a man. That, to his mind, seemed a disquieting state of affairs. He was not suggesting blame to anyone in connexion with the case, but he did suggest in the interests of the safety of the public consideration by the appropriate authorities whether machinery could not be devised to prevent the recurrence of such deplorable incidents.

UNITED STATES OF AMERICA.

(FROM AN OCCASIONAL CORRESPONDENT.)

White House Conference on Child Health.

President Hoover's interest in child health has long been known in America. His presidency of the American Child Health Association was but one indication of this interest, and another is his intention to summon a White House Conference on the health and protection of children. The first meeting of the planning committee was held in Washington on July 29th and was addressed by President Hoover, who hopes that the policies adopted by that Conference will be followed up by definite organisation throughout the country. Progress in this direction must for the most part be made by voluntary action and by activities of local government, but the Federal Government will attempt to secure some measure of unity as to view and as to programme.

Every subject bearing on child health, including the difficult subject of child labour upon which Congress has twice attempted to legislate without success, is to be brought under consideration. A sum of half a million dollars from private sources has been placed at the President's disposal to cover the expenses of the preliminary committees and for investigations which they may require. The Secretary of the Interior, Dr. Ray Lyman Wilbur, a past president of the American Medical Association, will have general charge of the Conference. The planning committee itself is drawn from organisations of quite diverse interests, and has a personnel which will inspire confidence.

Diploma Forgeries in Illinois.

Five men have recently been indicted before a grand jury in Chicago for the sale of licenses to applicants who were not properly qualified to practise medicine. True bills were returned on July 30th. The chief among this group is W. H. H. Miller, who was formerly director of the State Department of Education and Registration. This man was found guilty of selling licenses while in office, and eventually discharged, but is said to have claimed since his discharge that he retained all his influence in the department. The evidence is said to indicate that more than 1000 forged licenses have been issued. One man, said to be in possession of such a license for which he is supposed to have paid $1500, has already been arrested. He was found working as an orderly at the West End Hospital. A blank abortion release slip is alleged to have been found in his pocket.

Silver Polish Poisoning.

Several cases of acute poisoning of guests in hotels have been reported to the New York State Department of Health and are under investigation. A typical severe case is that of a man, aged 45 years, who was seized suddenly with nausea and severe colic. From midnight until 2.30 A.M. he vomited continuously, and thereafter suffered from tenesmus, diarrhœa, nausea, and continued retching. The patient was now covered with profuse perspiration, the skin cold, pallid, and cyanotic. The pulse was rapid, of low tension, and irregular. After three hours of active treatment with applied heat, hot coffee by mouth, and caffeine hypodermically, the shock subsided. One-eighth grain of morphine was placed under the tongue and the patient went to sleep. Recovery was uneventful. Three other persons who had partaken of the same evening meal

had similar though less severe symptoms. The State Department of Health has found that in every case where these acute poisonings have occurred the hotel management is in the habit of employing a silver polish manufactured by a New York firm. Analysis of this firm's products gives in every case a positive cyanide reaction. One silver polish put out by them was found to contain as much as 20 per cent. of sodium cyanide. Hotel managers who have ceased to use the polish on advice from the Health Department report a cessation of symptoms among their guests.

Lethal Possibilities of Vibratory Massage.

As Sandow exercises were the fashion in England a generation or so ago, at the present time in the United States there is a vogue for vibratory massage. The modern fad is mechanical—driven by electric motor. Apparently it is not without its dangers. The case is recently reported of a man who after an hour's "exercise" in a gymnasium under the supervision of a "physical director" developed an acute soreness in the abdomen, about an inch to the right of the umbilicus, some weakness and dizziness. He had, it seems, used an electrically driven vibrating massaging belt applied to his abdomen for the space of ten minutes. Next day he passed about 15 well-formed tarry stools, after which he was short of breath and of blood, and called his physician. The latter, as well as a consultant, believed that he was bleeding from a duodenal ulcer; the consultant had at that time in hospital a patient whose ruptured appendix was attributed to the use of a similar apparatus. The committee on physiotherapy of the Medical Society of the County of New York has on record a case of severe hæmorrhage of the bladder, resulting from five minutes use of an exercising machine, and is appealing through its chairman, Dr. Richard Kovacs, for information regarding other accidents that may have resulted from such machinery.

Diet in Tuberculosis.

The opinion of 36 prominent phthisiologists has been ascertained recently on the subject of diet in tuberculosis by Dr. John B. Hawes, of Boston, by the questionaire method. The idea that the patient should be stuffed seems now to have been universally abandoned. Extra meals are, on the whole, regarded with disfavour. Egg-nogg was the subject of considerable disagreement and violence of attack on the part of some specialists, rather surprising since no reason is offered for their aversion to this particular combination. As for milk, most of those questioned favoured a maximum allowance of one quart given daily—with, rather than between, meals. A good deal of emphasis was laid upon the importance of rest immediately before and after meals. Some were strongly of the opinion that five or six glasses of water should be drunk daily, others that most patients drink too much water. It is difficult to judge of the value of these opinions without knowing on what principles they were founded.

Governor Roosevelt creates a Spa.

The Governor of New York State has decided to exploit the resources of the State in mineral waters, and has selected Saratoga as the site of a model spa. The town is already a fashionable resort in beautiful country, not many miles south of Lake George, and devoted to horse-racing. It will be of interest to observe whether those in search of health will be deterred by the present somewhat noisy display of wealth or whether the Governor's plans will overshadow the existing attractions A medical advisory committee, including the president and the director of the New York Academy of Medicine, and the professors of medicine at Cornell University and the Albany Medical College, has been appointed to assist the State Commission charged with the development project. In a speech to the annual conference of Health Officers and Public Health Nurses the Governor explained the scope of his ambition. It is his hope that Saratoga may do great good for many human ills of the people of the State, and, moreover, point the way so that other States and other mineral springs can be developed along scientific and medical lines. From the Adirondacks to Georgia there are wonderful springs on both sides of the range, and both in the west and middle west there are springs going down through the Ozark mountains and borders of Oklahoma and Texas. Those of the Rockies extend down to Montana and Arizona, and in the Allegheny Mountains. The development of all these natural advantages may follow the Saratoga scheme should this prove a success.

Dental Research in Alaska.

The first complete dental equipment, including X rays, to be sent to the Eskimos of Northern Alaska is now on its way. The expedition is in charge of Dr. Leuman M. Waugh, the associate dean of the school of dental and aural surgery of Columbia University, who has been given a temporary commission in the public health service.

Appointments.

Dr. David Rapport, who has been appointed to the chair of physiology at Tufts College Medical School, graduated from Harvard in 1912, and from the Harvard Medical School in 1916. During the next two years he worked under Sir Thomas Lewis on the effort syndrome in soldiers, and has since taught at Harvard, Cornell, and Western Reserve Universities. Dr. William G. Gallie has been appointed to the chair of surgery at the University of Toronto. He gave the Hunterian lecture before the Royal College of Surgeons in 1924 on Transplantation of Fibrous Tissues in the Repair of Anatomical Defects.

NOTES FROM INDIA.

(FROM OUR OWN CORRESPONDENT.)

The All-India Medical Council.

THE proposed Bill "to establish a Medical Council in India and to provide for the maintenance of a British Indian Medical Register" met with a further check last month. The conference of Provincial Ministers of Public Health, Surgeons-General, and Inspectors-General of Civil Hospitals, assembled at Simla to consider the proposed measure, showed considerable opposition to the Bill. Although the deliberations of the conference have not been made public it is evident that the various provinces are unwilling to transfer their present powers of regulating medical education to a centrally constituted body, despite the fact that adequate provincial representation is provided for in the proposed scheme. Nevertheless, the case for the immediate formation of an all-India council is a strong one. The suspicion that such a council would arrogate to itself the function of prescribing the courses and curricula of the universities and medical schools is unfounded. It would naturally have to be satisfied of the adequacy of the standard of instruction in any given training centre before recognising its degrees for registration, but the onus of drawing up curricula so as to conform to the standard of proficiency set up by the council would rest with the various educational authorities concerned.

Tuberculosis in Bengal.

The gravity of the tuberculosis problem in Bengal may be realised when it is stated that there are in the neighbourhood of 800,000 cases in that province. Of these, about 200,000 require sanatorium treatment and there is no provision whatever for their accommodation. Dr. A. C. Ukil in a recent address urged the immediate necessity for the establishment of provincial organisations to study the disease and to devise measures for its prevention. A beginning has already been made by the establishment on a purely voluntary basis of the Tuberculosis Association of Bengal.

A New Leprosy Publication.

The Indian Council of the British Empire Leprosy Relief Association have decided to issue quarterly a small brochure entitled Leprosy in India, which is intended to form a means of communication between leprosy workers in this country. The first number, which has just come to hand, contains informative articles on the objects of the council, on a leprosy survey in Travancore State, and on anti-leprosy work in Bihar and Orissa and in Burma. These quarterly notes are distributed free of charge to those taking an active part in the work of eliminating leprosy from India.

The Services.

ROYAL NAVAL MEDICAL SERVICE.

Surg. Capt. H. J. Chater is placed on the Retd. List.

A. M. Lawrence-Smith and B. St. John Lyburn to be Surg. Lts.

The following appointments are notified: Surg. Comdrs. M. S. Moore to *Vindictive*; J. F. Haynes to *Victory* for R.N. Hospl., Haslar; P. L. Gibson to *President* for R.A.F. Medical Officers' Course; G. L. Ritchie to *Lowestoft*; D. C. Eglington to *Pembroke*, for R.N. Hospl., Chatham; and J. F. Place to *Pembroke*, for R.N. Barracks, Chatham.

Surg. Lts. R. C. Webster to *Shropshire*, and J. Johnston to *Lowestoft*.

Surg. Lt.-Comdr. J. F. Ainley to be Surg. Comdr.

ROYAL NAVAL VOLUNTEER RESERVE.

Surg. Lts. J. B. Oldham to *Victory* for R.N. Hospl., Haslar, for training; E. C. Johnston, commission terminated on entry into R.N.; R. W. H. Tincker to *Pembroke*, addl., for R.N. Barracks, Chatham, addl., for 14 days' training; and H. M. Willoughby to *Victory*, addl., for R.N. Barracks, Portsmouth, addl., for 14 days' training.

Surg. Lt. H. M. Petty to *Pembroke*, for R.N. Barracks, Chatham, for training.

A. J. W. Beard entered as Proby. Surg. Sub-Lt. and attached to the London Division, List 2.

ROYAL ARMY MEDICAL CORPS.

Lt.-Col. R. L. Popham, having attained the age for compulsory retirement, is placed on retd. pay.

Maj. T. B. Moriarty, D.S.O., to be Lt.-Col., vice Lt.-Col. R. L. Popham to retd. pay.

The undermentioned to be Lts. (on prob.): D. A. O. Wilson, T. R. J. P. Kerwick, T. G. D. Coneys, J. G. Black, A. N. B. Odbert, Temp. Lt. C. A. Levy (and relinquishes the temp. rank of Lt.), and S. W. K. Arundell.

Lt. A. H. Weston, from the R.A.M.C., T.A., to be Lt. (on prob.).

Lt. (on prob.) T. G. D. Coneys is secd. under the provisions of Art. 205, Royal Warrant for Pay and Promotion, 1926.

Temp. Lt. H. T. Chiswell relinquishes his commn.

ARMY DENTAL CORPS.

Capt. W. Philp to be Maj.

Lt. (on prob.) E. C. Irish is confirmed in his rank.

ARMY RESERVE OF OFFICERS.

Lt.-Col. R. L. V. Foster, having attained the age limit of liability to recall, ceases to belong to the Res. of Off.

TERRITORIAL ARMY RESERVE OF OFFICERS.

Maj. S. McCausland, having attained the age limit, relinquishes his commn. and retains his rank.

ROYAL AIR FORCE.

Flight Lt. G. H. H. Maxwell is promoted to the rank of Squadron Leader.

COMMISSIONS IN THE ROYAL ARMY MEDICAL CORPS.

The following have been granted commissions as Lieutenants on probation in the Corps:—D. A'Brook, M.R.C.S., University College Hospital; D. A. O. Wilson, M.B., Queen's University, Belfast; T. R. J. P. Kerwick, M.B., University College, Dublin; T. G. D. Coneys, L.R.C.P. & S.I., Royal College of Surgeons, Dublin; J. G. Black, M.B., University of Aberdeen; A. N. B. Odbert, M.B., Trinity College, Dublin; C. A. Levy, M.R.C.S., St. Thomas's Hospital; S. W. K. Arundell, M.R.C.S., Middlesex Hospital; A. H. Weston, M.B., University of Edinburgh; and E. A. Wilson, M.B., University of Edinburgh. Two of these officers have been seconded for the purpose of completing appointments in civil hospitals.

Correspondence.

"Audi alteram partem."

PENAL TREATMENT FOR NERVOUS DISORDER.

To the Editor of THE LANCET.

SIR,—That a police magistrate should consider the penal treatment of a patient suffering from a nervous disorder proper and fitting is not very surprising, but it is rather disturbing to find that you should approve of such a proceeding as you do in your issue of August 17th (p. 351).

The case to which I am referring is that of a man who had been addicted to morphia to the extent of 15 grains a day. Under treatment this was reduced to ½ grain, and at this point the patient was discharged from treatment through no fault of his own. He was given a prescription for one single half grain of the drug. What was the man to do? Everyone knows that such a patient must somehow obtain more morphia. He seems to have regularised his position later on by getting prescriptions from other doctors, but unfortunately before doing so he falsified this prescription, and so illegally got possession of 12 grains. For this he received three months' imprisonment, with your approval.

The first point that strikes me is this: is imprisonment likely to cure such a patient? I know of one patient who was sent to prison for the crime of illegal possession of morphia, and he was not cured. The drug was cut off at once, and those who know anything of the morphia craving will realise what that means. On the day of his release, he succeeded in buying the drug without difficulty. Again, ought we doctors to applaud the fixing of the stigma of imprisonment on a patient; ought we not rather to endeavour, as we do for the insane, to lead the authorities to see that stigmas are good for nobody, and that patients will do better if treated without them.

To seduce a person into taking morphia is a grave moral offence, and is rightly punishable by law; but in what sense, legal or moral, is morphia addiction an offence. This man had not led anyone into the morphia habit, and I am unable to agree with you in your dictum that "The case shows the administration of the law in the best interests of the accused."

I am, Sir, yours faithfully,

T. A. ROSS.

Swaylands, Penshurst, Kent, August 21st, 1929.

CHORDOTOMY IN THE TREATMENT OF OSTEOARTHRITIS OF THE HIP.

To the Editor of THE LANCET.

SIR,—I was much impressed by Mr. Bankart's admirable paper in your issue of August 24th (p. 378) on the treatment of this condition by division of the spino-thalamic tracts. Before deciding to carry out the operation myself, however, I should like to learn from Mr. Bankart a little more detail. For example, how does he recognise the part of the spinal cord requiring section, and how does he divide it? In my edition of "Cunningham's Anatomy" (which I admit is dated 1906) it is stated that "as the spino-thalamic tract ascends in the cord its fibres are not gathered into a compact strand, but are more or less loosely scattered in the lateral column." Does Mr. Bankart divide as much as one-fourth of the spinal cord, and how does he guard against the danger of producing paralysis?

One other point: Mr. Bankart does not mention a method of treatment which is most useful in these cases—namely, giving the patient a pair of crutches. If the case be one in which there is no pain when the patient is recumbent, crutches entirely prevent the pain from coming on when he is up and about. Strange to say, absence of irritation in this disease appears to

favour the production of ankylosis, and when this has become sound all pain in the hip vanishes and the crutches can be discarded. Though this may take years the cure of the pain is certain.

I am, Sir, yours faithfully,

PAUL BERNARD ROTH.

Welbeck-street, W., August 24th, 1929.

To the Editor of THE LANCET.

SIR,—The operation of chordotomy clearly has come to stay, and there is no difficulty in enumerating the conditions in which for the relief of paroxysms or everlasting pain the operation will now probably be performed. The skill of the surgeon with his full and bloodless exposure makes the operation appear easy enough. Good nursing, as a rule, does the rest. But it is the physician who probably will continue to shoulder the prime responsibility. With experience of antero-lateral tract section and of medio-longitudinal section (suggested first, I believe, by Dr. J. G. Greenfield) I think that the latter operation is more easily performed than the former; also it appears to be based on a sounder anatomy. The anterior spinal artery is not injured by the skilled surgeon. It is important that the decision to operate shall be made long before the patient is worn out by his pain, by drugs, or by time. I have under observation at the moment a man on whom complete medio-longitudinal chordotomy (traumatic spina bifida) was performed a few weeks ago through four segments of his thoracic cord for the relief of crises. He appears to have therefrom no impairment of sensibility whatever to thermal stimuli.

I am, Sir, yours faithfully,

HILDRED CARLILL.

Harley-street, W., August 24th, 1929.

THE NEW VACCINATION ORDER.

To the Editor of THE LANCET.

SIR,—In regard to the new Vaccination Order, I recall that the most successful vaccinations I ever witnessed were performed by a former colleague of mine, the late Arthur Cæsar, public vaccinator for the Eastern District Hamlet of Mile End Old Town. With the lower part of the cutting edge of a broad spear-headed lancet held almost flat to the skin, by a gentle incising movement he slightly lifted the epidermis forming, as it were, a valve shutting in the lymph. He never scratched with the point, scarcely drew blood, was nearly always successful, and very little inflammation followed the operation.

I am, Sir, yours faithfully,

FREDK. WM. ALEXANDER,
At one time Public Vaccinator, Western District Hamlet of Mile End Old Town; formerly M.O.H., Metropolitan Borough of Poplar.

Teddington, August 27th, 1929.

ANTIDYSENTERY BACTERIOPHAGE.

To the Editor of THE LANCET.

SIR,— As the author of the paper "Antidysentery Bacteriophage in the Treatment of Bacillary Dysentery" published in THE LANCET of August 10th, may I be permitted to reply to some of the points of criticism raised in your leading article on the subject in the same issue.

The impression created by your article in regard to my clinical results in the treatment of dysentery with bacteriophage is, that there was an initial "maximum beneficial effect" in just over 50 per cent. of the cases treated. This calculation and the expression of it can only be arrived at if we take a phrase from its context and ignore the rest. It thus represents only half, and, as may be agreed, the less encouraging half of the facts. In my "severest possible analysis" of the results, I was able to show that there were in all only 17 results that could be considered as failures, leaving 45 successes, which represents "a minimum percentage success for the treatment of 72·6." As I believe, I made sufficiently clear, this calculation is based on a reasoned interpretation of the facts, and it is the only one valuable. To it, I would add my considered judgment that "the general result of phage treatment for bacillary dysentery appears very much in its favour" as is borne out by the fact that more than "70 per cent. of the cases showed a well-defined and rapid improvement."

It is unfortunate that, through lack of space, you had to sacrifice the Table of "Clinical Records" accompanying my paper, since you appear to cast some doubt on the subsequent recovery of the cases in which the treatment was even most successful. This table would, I think, have enabled you and your readers to appreciate better the course of events from initial improvement to recovery. The word "recovery" is, I know, a very mobile one in medicine, but if there is any need to be more exacting about it in phage-cured dysentery than in other diseases, everything is in favour of the dysentery-cured patient.

As to your statement that in many cases of bacillary dysentery "the infection may be self-limiting" so that "recovery may occur without any specific treatment," I presume you mean here recovery by saline or other purgation treatment. In that case, reference to the third paragraph, p. 274, of my paper will provide a reasonable explanation of the "recovery" of the majority of such cases. In my opinion these cases are mostly phage "cures." Any doubt in regard to this may be dispelled by a persistent examination for the presence of phage of a number of acute dysentery stools—the patients being on no specific treatment whatever—when sooner or later phage will be found appearing among the recovery patients. These, then, are recoveries due to specific phage development. Such investigations underlie the phrase "other considerations," which perhaps escaped you, in the same paragraph.

This leads me to comment also upon the following remarks in your article:—

> "Only rigidly controlled parallel series of treated and non-treated cases will give information of real and lasting value," dysentery being "by no means always a serious and progressive malady." And again, "Since the evidence of the value of this treatment is anyhow not so convincing as to make it inhuman to withhold it from any sufferer, it would be a real service to therapeutics if those who, like Dr. Compton, have access to an unlimited number of cases of bacillary dysentery would treat alternate cases with the *bacteriophage* and the others by any one of the *approval methods* (italics mine), giving in each case a detailed bacteriological examination before and during treatment and chronicalling the clinical course. Only by such an investigation can the question be solved which ten years of scattered observation and uncontrolled reports, suggestive though they may be, have still left unanswered."

What does this mean? Are you here proposing saline treatment versus phage treatment alone or, on the other hand, serum treatment plus saline (a recognised approval method) versus phage alone? That the suggestion is for one of these methods is clear, I think, from your further remarks that in my cases:—

> "The ordinary saline treatment was carried on coincidently with the specific measures. Such a result, taken at its face value, appears to be excellent, but it is a constantly recurring lesson in medicine that face value results are not safe guides to the value of medicaments."

Let us consider the methods that at present hold the field. In the state of our knowledge to-day there appears to me to be fundamentally a choice of three: (1) saline alone; (2) antidysentery serum plus saline; (3) antidysentery bacteriophage plus saline. Saline I have included in all, because this is classical; and with reason; for, whatever lesions the microbes of bacillary dysentery may provoke, it is essential to combat the toxæmia of the disease resulting from the liberated bacterial endotoxins. That, I take it, is the chief raison d'être of sodium sulphate by mouth, or, in the graver cases, physiological saline subcutaneously. Concerning the first of these methods, saline treatment, as there is nothing specific about this, it is obvious that when "cure" results there is reason to suspect the intervention, as already suffi-

ciently insisted upon, of endogenous specific phage; d'Herelle has suggested that the origin of such phage may be symbiotically contaminated coliform bacilli. As concerns the second method, serum therapy, saline is always prescribed as a means of keeping the large bowel well flushed out and thus combating toxæmia. Yet does not the antiserum itself contain endotoxin neutralising antibodies? It is supposed to. Surely, then, if any specific treatment might lend itself to dispense with coincident saline treatment it would be this. But it does not. Why then, coming to the third method, should the patient not have the benefit of saline treatment also when phage therapy is adopted? Here I consider salines by mouth more than ever necessary, at least initially, because the attack of the phage on the offending bacilli means, theoretically at least, the liberation of endotoxin in relatively important amounts.

In view of all this, I am bound to consider your suggestion in regard to "controlled parallel series," treating "alternate cases with the bacteriophage and the others by any one of the approval methods," as entirely beside the point. Present-day knowledge in no way justifies such an experiment.

I am, Sir, yours faithfully,

Alexandria, August 23rd, 1929. A. COMPTON.

SUBJECTIVE PHENOMENA AND COLOUR VISION.

To the Editor of THE LANCET.

SIR,—All visual phenomena are subjective as is well realised by the physiologist and medical man. For instance, if all men and women were totally colour-blind there would be no such thing as colour or if everyone, like a percentage of men, saw only three colours in the spectrum red, green, and violet there would be no such colour as yellow. In a recent book a well-known physicist makes the following statement. "When we are dealing with something definite and tangible such as a colour," but a colour is not definite and tangible. Again, many physicists treat the old theories of colour vision as if they were demonstrations in mathematics—that is, any set of facts is put into mathematical form in correspondence with the theory. If another set of facts be taken an entirely different mathematical arrangement is given. Each mathematical arrangement may be correct but both cannot be true, any more than a man could have his left ear absent, deformed, and normal all at the same time.

The visual phenomena to be described are seen best as soon after awaking in the morning as possible. If the reader find that he cannot immediately see any of the phenomena described or even fail after repeated trials—though this is not at all likely—he should select one of the most intelligent men or women of his acquaintance, and having described the conditions of the experiment, without giving any clue to the phenomena to be observed, ask his friend what he sees in the requisite conditions. When his friend has described the phenomena which follow he will probably have no difficulty in seeing them himself. If on awaking in the morning the reader will look at a window or windows, preferably more than one, then immediately close his eyes and cover them with a pillow, he will see a very clear-cut positive after-image of the windows and adjacent wall. All the light parts will be light and the dark parts dark. If the eyes be kept quite still it will be noticed that the light parts gradually approach the centre of the field of vision and finally disappear with a movement exactly like that of a whirlpool. If, however, when the eyes have been covered they be moved rapidly from side to side the central dark parts of the after-image will be obliterated and the light parts form themselves into a light blur. Now this experiment is very significant, it proves conclusively that the photo-chemical stimulus in vision is movable in the retina. The cause of this movement is undoubtedly the contraction of the muscles of the eye causing unequal pressure on different portions of the retina.

Now observe the effect of moving material on the centre of the retina. On opening one eye on awaking in the morning and looking at the ceiling the central portion is seen as an irregular, circular, rhomboidal, or star-shaped black spot. On closing the eye again a bluish-violet circle appears at the periphery or middle of the field of vision, contracts, and then after breaking up into a star-shaped figure and becoming brighter disappears, to be followed by another contracting circle. If the eye be opened when the star figure has formed in the centre it will appear as a bright rose-coloured star, much brighter than any other part of the field of vision. If, however, we wait till the star has broken up and disappeared before opening the eye, it will be found that only a black spot is seen in the centre. Helmholtz, though he saw the foveal region, sometimes dark and sometimes bright, states that he was never able to reproduce the latter condition voluntarily though the above shows how it may be done, and that he could not explain the facts. This experiment shows conclusively that the foveal region is sensitised from the periphery.

Currents seen in the field of vision are not due to the circulation. These currents may be seen in numerous ways. The following is an easy method of seeing them. If one eye be partially covered with an opaque disc, whilst both eyes are directed forwards in a not too brightly illuminated room and special attention be paid to the covered eye an appearance of whirling currents will be seen with this eye. These currents appear to be directed towards the centre, and have a very similar appearance to a whirlpool. On closing both eyes all the portion in which the whirling currents are seen appears as dull purple. These currents cannot be due to blood-vessels, because we know that the centre of the retina, corresponding to the point where the greatest movement is seen, is free from vessels. The appearance is also very different from that of the movement of blood in vessels. The experiment succeeds best if the eyes have been previously exposed to a fairly bright light. An opaque disc in a spectacle frame suffices admirably, a certain amount of light being allowed to enter the eye from the periphery. Ferree[1] finds, and I agree with him, that the streams carry with them the visual quality, colour, and brightness of the background from which they come. Ferree considers that eye movement is the chief or sole factor in the formation and direction of these currents, but I see them quite clearly with my eye quite still, and the whirling in the centre is not appreciably different when the eye is moved from one point to another. The masterly paper by Ferree should be read by anyone interested in the subject of vision. The illustrations are very good.

Numerous other subjective phenomena have been described by me[2] and by Purkinje, and all the facts strongly support the theory of vision which I gave in 1889—namely, that the cones are the sole terminal perceptive elements, the rods being concerned with the formation and distribution of the visual purple. Apart from the numerous facts against the duplicity theory, which supposes that the rods are percipient elements for perception in a dim light, it will be found that it is supported almost entirely by misstatements—namely (1) that certain animals have only cones and others have only rods; (2) that the periphery of the retina is colour-blind; (3) that the eye is totally colour-blind in dark adaptation; (4) that the Purkinje phenomenon and the recurrent image are not found with the fovea.

With regard to these I offer the following criticisms. (1) Though I have examined numerous collections I have never been able to find any animal with only rods or only cones, neither have I found anyone who has seen such a retina. The tortoise is the most quoted; it is stated to have only cones. The rods and cones in the retina of the tortoise are as clearly defined and distinct as in the human retina.

[1] Amer. Jour. Psychol., 1908, 484.
[2] The Physiology of Vision, London, 1920.

(2) The periphery of the retina is not colour-blind, when colours of sufficient intensity are used. The reader can test this for himself with a doctor's red lamp. He will find he can see it as red to the extreme periphery.

(3) In dark adaptation the eye is not totally colour-blind. Further, there is no scotoma or blind area corresponding to the rod-free portion of the macula which is equal to a visual angle of about three degrees.

(4) The Purkinje phenomena and recurrent image are found with the fovea. Hess showed not only that the recurrent image was found with the fovea, but also that it was bent outwards at this region as it would be if the visual purple had to flow into the fovea. Helmholtz and Nagel stated that there was no evidence that the rods were percipient elements.

This letter summarises a communication read last July before the Association Française pour l'Avancement des Sciences at their Congress in Havre, and will, I hope, interest a medical audience.

I am, Sir, yours faithfully,

F. W. EDRIDGE-GREEN,
Special Examiner and Adviser to the Board of Trade on Colour Vision and Eyesight.

Willesden Green, August 12th, 1929.

DISINFECTANT PACKETS

To the Editor of THE LANCET.

SIR,—In the report of the meeting of the fourth Imperial Social Hygiene Congress in your issue of July 20th (p. 140) you quote Mrs. Rolfe as having given certain figures "for what they were worth." May I suggest that their value is not greater than zero? The statistical genius which sets five army corps with a gonorrhœal incidence-rate of 18·70 per 1000 as a control to five army corps with an incidence-rate of 10·92 per 1000 does not deserve to be noticed, and the phrase, "difference in favour of the men not provided with packets," whether yours or Mrs. Rolfe's, can be based on nothing but desire.

I am, Sir, yours faithfully,

J. ROSSLYN EARP.

Denver, Colorado, August 16th, 1929.

Obituary.

EDWARD ERSKINE HENDERSON, M.B. CAMB., F.R.C.S. ENG.

THE sudden death of Edward Henderson occurred while on a fishing holiday in Ireland. The eldest son of the late Dr. Edward Henderson of Shanghai, Edward Erskine Henderson was born in China in 1870. He was educated at Harrow, St. John's College, Cambridge, and Guy's Hospital. Having taken the M.B. in 1895, he was house surgeon at Guy's to Mr. Golding Bird, and obstetric assistant to Dr. Peter Horrocks. On leaving Guy's he married and went out to join his father's firm, but he did not stay long in the East. While there, he held the post of assistant surgeon to the Shanghai Hospital. He came home in 1898 and began working for the F.R.C.S. He was also enrolled as a student at Moorfields Hospital, working with Sir John Tweedy and Mr. William Lang, and later with Mr. Lang and Mr. Lawford. He was clinical assistant at Moorfields for 15 years. For many years he held the post of ophthalmic surgeon to the Queen Mary's Hospital for the East End and was at one time assistant surgeon to the South London Ophthalmic Hospital, but increasing deafness spoiled his chances of other appointments, and professionally he was best known as an efficient editor of ophthalmic journals. He joined the editorial staff of the *Ophthalmic Review* in 1909 and in the next year was chosen editor; he carried this journal through critical times until it was amalgamated with the Royal London Ophthalmic Hospital *Reports* and the *Ophthalmoscope* in the *British Journal of Ophthalmology* in 1917. He was sub-editor to the late Sydney Stephenson till 1923 and editor in-chief thence onward till his death. With Prof. E. H. Starling he was the author of a valuable research on the factors which determine the formation of the intraocular fluid; and he assisted the late R. H. Clarke in the latter's experimental work on the minute anatomy of the central nervous system.

Henderson was a most versatile man; his manipulative dexterity showed itself not only in operations but in the beautiful work in wood and ivory which he did on the lathe. He was a good sportsman in every sense of the word; a first-class shot with the pistol, he competed regularly at Bisley in the years before the war. He was well read, and disliked colloquialism and slang. His eldest son was killed in battle in 1918. Much sympathy will be felt with his widow and children in their bereavement.

RAPHAEL BELILIOS, M.D., F.R.C.S. EDIN.

THE death occurred on June 19th, at Shanghai, of Dr. Raphael Belilios, from complications following an operation for an acute appendicitis.

Born in 1873, Dr. Belilios was the elder son of the late A. R. Belilios, J.P., and received his medical education at Edinburgh, where he graduated M.B., Ch.B., in 1901. He later took the M.D. with honours and the D.T.M. (Lond.) and became F.R.C.S. Edin. After a short period of practice at Muswell Hill while continuing his special study of the eye, Dr. Belilios emigrated to Hong-Kong where he soon established a large general practice. He held appointments as lecturer and examiner in anatomy and physiology in the Hong-Kong School of Medicine. Deciding to devote himself entirely to ophthalmology, he moved to Shanghai in 1912 and became one of the foremost authorities on the eye in the Far East, his reputation extending to Europe. Patients from all parts of China came to Shanghai to consult him, while Eastern potentates sent escorts for him when they required his services. Dr. Belilios became lecturer and later professor of ophthalmology in the St. John's University of Shanghai and ophthalmic surgeon to St. Luke's Hospital. On the arrival of the British Defence Force in 1927 he was appointed consulting oculist to the corps.

Dr. B. H. S. Aylward, Port Health Officer, Woosung, Shanghai, writes: "I first met Belilios in 1897 at Edinburgh, when he was reading for his second professional, and we soon became close friends. He and his wife who survives him lived near to the Royal Infirmary, and many were the pleasant evenings his circle of close friends spent there. His wife was an accomplished musician, and used to encourage us in our attempts to sing grand opera. Belilios himself had a pleasant tenor voice. He was a keen fisherman, but his principal hobby was conjuring, at which he was expert; possibly the training of his hand by conjuring at Edinburgh had something to do with his dexterity as an operator. Belilios was the most generous of men, in word and deed. He was a brilliant worker and never lost his enthusiasm."

THOMAS WILLIAM BUCKLEY, M.D. DURH., M.R.C.S. ENG.

Dr. T. W. Buckley, who died on August 8th, was born at Betley, Staffs, in 1859. He received his medical education at St. Thomas's Hospital and Owens College, and qualified L.S.A. in 1882, and M.R.C.S. Eng. in 1883. He took the M.D. of Durham University in 1900. He acted for a time as assistant to his uncle, Dr. Thomas Morton, and later was assistant house surgeon at the Staffordshire County Infirmary and surgeon on one of the vessels of the Ocean S.S. Company. In 1888 he bought a practice at Thrapston, Northants, and in partnership with the late Dr. J. W. Gainer, worked over a huge rural district for 20 years. He was M.O.H. of the district and J.P. for Northamptonshire. On the outbreak of war, Dr. Buckley immediately volunteered for service abroad. Refused at first on account of his age, he received a commission in 1915, and was sent to a military hos-

pital at Shoreham. In 1915, having been promoted to the rank of major, he acted for a year as Assistant Commandant and Officer Commanding the R.A.M.C. detachment at Princess Christian Military Hospital, Englefield Green. In 1916 he was appointed to No. 2 Special Medical Board, Caxton Hall, ultimately becoming its President. The work was very heavy, involving visits of inspection to hospitals in and round London, and many hours of writing reports, as well as the routine work of the Board. Dr. Buckley was not demobilised till 1919, and never quite recovered from the strain of the war years. He spent the rest of his life very quietly in the little village of Clopton, a few miles from the centre of his old practice. Fond of reading and of country life, he was never at a loss for occupation. Dr. Buckley was modest about his own attainments, which were considerable. He had a keen sense of humour, and could tell many interesting stories of his experiences. He leaves a widow, son, and two daughters, one of the latter being a medical woman.

Medical News.

SOCIETY OF APOTHECARIES OF LONDON.—At recent examinations the following candidates satisfied the examiners in the undermentioned subjects:—

Surgery.—P. S. Balachandran, Middlesex Hosp.; K. C. Bhattacharyya, Calcutta and St. Thomas's Hosp.; A. Clark, Glasgow and London Hosp.; R. J. Kagan, St. Mary's Hosp.; N. H. Kettlewell, Bristol; J. M. Lees, Guy's Hosp.; J. E. Moody, St. Mary's Hosp.; C. Parthasarthe, Birmingham; A. Somerville, Sheffield; and A. W. B. Wiggins, Sheffield.

Medicine.—K. C. Bhattacharyya, Calcutta and St. Thomas's Hosp.; P. D. Kapur, Glasgow; N. H. Kettlewell, Bristol; H. H. Lakin, Birmingham and London Hosp.; J. M. Lees, Guy's Hosp.; A. Liberis, St. Bartholomew's Hosp.; W. McDermott, London Hosp.; R. Norrie, St. Andrew's; E. J. O'Loughlin, Birmingham; and A. W. Tam, Singapore.

Forensic Medicine.—K. C. Bhattacharyya, Calcutta and St. Thomas's Hosp.; W. T. Ellis, Charing Cross Hosp.; B. L. Fishout, Cardiff and Manchester; W. M. Hamer, Manchester and Charing Cross Hosp.; J. M. Lees, Guy's Hosp.; C. A. Munro, Glasgow; E. J. O'Loughlin, Birmingham; and S. Ramadas, St. George's Hosp.

Midwifery.—J. Britanischski, Berlin and London Hosp.; R. Gilmore, Manchester; W. St. A. Hendricks, St. Mary's Hosp.; C. Hortop and J. M. Lees, Guy's Hosp.; A. R. Madden, St. Mary's Hosp.; A. Somerville, Sheffield; and F. A. Yarde, St. Mary's Hosp.

The Diploma of the Society was granted to the following Candidates, entitling them to practise medicine, surgery, and midwifery: B. L. Fishout, N. H. Kettlewell, H. H. Lakin, J. M. Lees, C. Parthasarthe, and A. W. Tam.

INDUSTRIAL WELFARE SOCIETY.—At the tenth annual lecture conference to be held at Balliol College, Oxford, from Sept. 13th to 17th, the afternoon session on Monday will be devoted to industrial health. Dame Louise McIlroy will address a special session for women at which Dr. Margaret Hossell will preside, and Dr. D. A. Coles will take the chair at a special session for men on Health Problems in Industry. On the previous Sunday evening Mr. D. R. Wilson is lecturing on Fatigue Research and its Practical Application in the Factory.

ST. JOHN'S HOSPITAL FOR DISEASES OF THE SKIN.—This institution, which has its out-patient department in Leicester-square, and receives in-patients at 262, Uxbridge-road, last year treated 214 in-patients, whose average stay was 42 days, and 10,528 new out-patients. The annual report records that the receipts from donations fell by £400, following a fall of £600 in the previous year, and the Board of Management express "grave fears" for the future unless larger financial help is forthcoming. There were 2480 laboratory examinations and 875 patients were treated in the X ray department.

TRELOAR CRIPPLES' HOSPITAL.—The Alton hospital, founded by Sir William Treloar, comes of age this month, and there is to be a dinner at the London Mansion House on Oct. 22nd to celebrate the occasion. The opportunity will be taken to make an appeal for £100,000, the estimated cost of new buildings. The present buildings are the wooden structures of the Princess Louise Military Hospital, erected for the wounded in the South African war, and now worn out. The trustees find that the cost of repair and maintenance exceeds the interest on the cost of rebuilding. The hospital was originally designed for 200 patients; and to-day at Alton and Hayling Island the number of crippled children under treatment is 405.

SOCIETY FOR THE STUDY OF INEBRIETY.—The thirteenth Norman Kerr Memorial Lecture will be delivered by Sir Josiah Stamp, G.B.E., LL.D., D.Sc., on Tuesday, Oct. 8th, at 4 P.M., in the Great Hall of the B.M.A. House, Tavistock-Square, London, W.C.1., the subject being Alcohol as an Economic Factor.

CASTLEFORD, NORMANTON AND DISTRICT HOSPITAL.—On August 23rd Princess Mary opened this new hospital which has been built at a cost of £42,000.

HOSPITAL DINNERS.—The annual old students' dinner of St. Bartholomew's Hospital will be held in the Great Hall of the Hospital on Tuesday, Oct. 1st, at 7 for 7.30 P.M., Sir Frederick Andrewes in the chair.—The annual dinner of St. George's Hospital Medical School will take place on the same day, 7.15 for 7.45 P.M., at the Hyde Park Hotel, Knightsbridge, when Mr. D. Cotes-Preedy, K.C., will preside.

WESTMINSTER OPHTHALMIC HOSPITAL.—According to the annual report, the new hospital, which was opened exactly a year ago, "is far from being completely equipped, and is not yet in full working order." At the end of the year only 42 beds contained in two wards had been opened. Henceforward a much larger income will be needed to meet an expenditure which must necessarily increase considerably, and the committee appeal for a revenue of £20,000 a year.

YORKSHIRE HOSPITALS AND MOTORING ACCIDENTS. The *Yorkshire Evening Post* publishes the results of an inquiry into the cost and the degree of pressure upon the hospitals of that county caused by motoring accidents. In the first six months of the present year 560 victims of such casualties were treated at Leeds Infirmary, of whom 252 were admitted. They cost £1977, of which £176 was repaid by patients; £75 of this was a thank-offering from one patient. Last year Bradford Infirmary received £24 towards the £1174 spent upon 137 in- and 229 out-patients. In the year ended in April last some 600 cases were treated in the casualty ward of Hull Royal Infirmary, and 125 in-patients cost £924, of which £85 was repaid. The annual report of Doncaster Royal Infirmary states that last year 3898 casualty patients were treated, and that the wards are so constantly filled with motoring accident cases that it is impossible to deal with the long waiting list of local persons requiring operations.

METROPOLITAN DISTRICT NURSING ASSOCIATION.—This institution employs 19 trained nurses for the sick poor of Central London, who last year paid over 50,000 visits and, in addition, saw nearly 40,000 patients at clinics, dispensaries, and treatment centres in Westminster, Finsbury, Holborn, and St. Pancras. During the severe epidemic of measles in the spring 449 cases of that disease were referred to the Association, of which more than one-half had complications requiring skilled nursing; only five of these acute cases died. The 144 maternity cases all did well. The Association, which was founded by Florence Nightingale and others in 1875, last year spent £3456 of an income of £3939.

QUEEN CHARLOTTE'S MATERNITY HOSPITAL.—On Tuesday in last week the first sod was cut for the new buildings that are to be erected in Goldhawk-road, Hammersmith. Provision is being made for 358 beds, but the isolation block is to be erected first, with 30 beds for cases of puerperal sepsis, a disease for the investigation of which a special laboratory is being provided, with a staff of bacteriologists, doctors, and nurses placed in a house adapted for the purpose and connected by a covered way with the isolation block. Princess Mary is to lay the foundation-stone on Nov. 4th, but the removal from Marylebone-road will be gradual, since the present 80 beds will be more than quadrupled when the scheme is complete and the money available. The beginning is being made with the money raised by the National Mother-saving Campaign launched by the hospital two years ago. The site has some fine trees which, as far as possible, are being preserved.

DONATIONS AND BEQUESTS.—Dr. Robert Hamilton, of Leeds-road, Harrogate, left over £3000 to charities, including £250 each to the Bradford Royal Infirmary, the Bradford Children's Hospital, the Bradford Royal Eye and Ear Hospital, the District Nursing Association; and £200 each to Dr. Barnardo's Homes, the National Children's Institution, and the Bradford Institution for the Blind. The testator also gave £100 each to Harrogate Infirmary, Harrogate Hospital, Harrogate Home for Incurables, the Royal Medical College, Epsom, Victoria Children's Convalescent Fund, Royal Albert Asylum, Lancaster, and four other institutions.—Mr. Emile John Frank Hardenberg, M.R.C.S., L.R.C.P., of Frederick-road, Chingford, left £2500 to the London Orphan School, Watford, and £1000 to Guy's Hospital.

Appointments.

RICHMOND, HENRY, M.B. Birm., D.P.H., has been appointed Tuberculosis Officer for Wigan.

UNDERWOOD, E. A., M.B., Ch.B.Glasg., D.P.H., Deputy Medical Officer of Health for Rotherham.

Certifying Surgeons under the Factory and Workshop Acts: BOOTH, W. N., M.B., B.S.Durh. (Harlow and Parndon District of Essex); EVANS, J. P., L.R.C.P. Lond., M.R.C.S., (Colwyn Bay); and SUNDERLAND, E. B., L.R.C.P. Lond., M.R.C.S. (Haverill District of Suffolk).

Vacancies.

For further information refer to the advertisement columns.

Albert Dock Hospital, Connaught-road, E.—M.O. At rate of £110.
All Saints' Hospital, 91, Finchley-road, N.W.—Jun. H.S. Also Asst. H.S. At rate of £150 and £100 respectively.
Ancoats, Manchester, Crossley Maternity Hospital.—Half-time R.M.O. at rate of £50.
Ashton-under-Lyne District Infirmary.—H.S. At rate of £150.
Ayr County Hospital.—2 H.S.'s. Each at rate of £150.
Bangor, Carnarvonshire and Anglesey Infirmary.—H.S. £200.
Bath, Royal United Hospital.—H.S. At rate of £150.
Beckenham Urban District Council.—Part-time Asst. M.O. £325.
***Birkenhead General Hospital.*—Cas. S. £100.**
Birmingham and Midland Eye Hospital, Church-street.—H.S. £110.
Birmingham Ear and Throat Hospital.—Third H.S. At rate of £150.
Blackburn and East Lancashire Royal Infirmary.—Res. H.P. £150. Also 4th H.S. £130.
Bolingbroke Hospital, Wandsworth Common, S.W.—H.S. At rate of £120.
Bootle Borough Hospital, Derby-road.—Hon. Laryngologist and Aurist. Also Jun. M.O. At rate of £125.
Bradford Royal Eye and Ear Hospital.—Jun. H.S. £120.
Bristol General Hospital.—H.S. to Special Departments. At rate of £60.
Bournemouth, Royal Victoria and West Hants Hospital.—Two H.S.'s. Each at rate of £120.
Bury Infirmary.—H.S. At rate of £150.
Cambridge, Addenbrooke's Hospital.—Res. Anæsthetist. At rate of £180. Also H.P. and H.S. Each at rate of £130.
Cambridge, Papworth Village Settlement.—H.P. At rate of £100–£200.
Central London Throat, Nose, and Ear Hospital, Gray's Inn-road, W.C.—Hon. Chief Clinical Assts.
Chester, East Lancs. Tuberculosis Colony, Barrowmore Hall, Great Barrow.—Asst. M.O. £250.
Chichester, Royal West Sussex Hospital.—Hon. Asst. Orthopædic Surgeon.
City of London Maternity Hospital, City-road, E.C.—Asst. Res. M.O. At rate of £80.
Dreadnought Hospital, Greenwich.—H.P. and H.S. Each at rate of £110.
Eastbourne, Princess Alice Memorial Hospital.—Jun. H.S. At rate of £100.
East Ham Memorial Hospital, Shrewsbury-road, E.—Res. M.O. At rate of £200.
East London Hospital for Children, &c., Shadwell, E.—Res. Cas. O. At rate of £125.
Exeter, Royal Devon and Exeter Hospital.—H.P. Also Asst. H.S. At rate of £130 and £120 respectively.
***Freemasons Hospital and Nursing Home, 237, Fulham-road, Chelsea, S.W.*—Res. M.O. At rate of £250.**
***Great Yarmouth General Hospital.*—Sen. H.S. £150.**
Hospital for Sick Children, Great Ormond-street, W.C.—Asst. Path. and Research Fellow. £450. Also H.S. and H.P. Each at rate of £100.
Indian Research Fund Association, Simla.—Bacteriologist. Also Research Worker. Each Rs. 1500 per mensem.
Iraq Government.—M.O. Res. 1500 per mensem.
King's Lynn, West Norfolk and Lynn Hospital.—Sen. H. S. Also Jun. H. S. At rate of £150 and £100 respectively.
Leeds Hospital for Women.—Hon. Surgeon.
Leicester, North Evington Infirmary.—Res. M.O. £250.
London Lock Hospital, 91, Dean-street, W.—H.S. At rate of £200.
***Lowestoft and North Suffolk Hospital.*—H.S. £150.**
Manchester, Baguley Sanatorium.—Asst. M.O. £350.
Manchester, Monsall Hospital for Infectious Diseases.—Jun. M.O. £350.
Manchester Royal Eye Hospital.—Jun. H.S. £120.
Manchester, Salford Royal Hospital.—Two H.S.'s. Also Cas. H.S. Each at rate of £125.
Manchester Royal Infirmary.—Jun. Asst. M.O. for Radiological Dept. £350. Also 2nd Surg. Reg. £150.
Maidstone, Kent County Ophthalmic and Aural Hospital.—Aural H.S. At rate of £200.
***Margate, Royal Sea Bathing Hospital.*—H.S. At rate of £100.**
Middlesex County Council.—Asst. County M.O.H. £750.
Miller General Hospital, Greenwich-road, S.E.—H.P. At rate of £125.
Northampton General Hospital.—H.P., H.S., and Asst. H.S. Each at rate of £150.
North Middlesex Hospital, Edmonton, N.—2nd Asst. S. £500.
Nottingham General Hospital.—H.P. Also 2nd Cas. O. Each at rate of £150.
Otago and Dunedin University Hospital, New Zealand.—Sen. Res. M.O. £500.
Princess Louise Kensington Hospital for Children, North Kensington.—Hon. Radiologist.
Queen Charlotte's Maternity Hospital, Marylebone-road, N.W.—Res. Anæsthetist. At rate of £80.
Radcliffe-on-Trent, Notts County Mental Hospital.—Jun. Asst. M.O. £350.
***Rotherham Hospital.*—H.S. £180.**
Royal Chest Hospital, City-road, E.C.—Res. M.O. At rate of £150 Also Out-patient M.O. and H.P. Each at rate of £100.
***Royal National Orthopædic Hospital, 243, Great Portland-street, W.*—H.S. £150.**
Royal National Orthopædic Hospital, Country Branch, Middlesex.—H.S. £150.
Southampton, Royal South Hants and Southampton Hospital.—Jun. H.S. Also Cas. O. At rate of £130 and £120 respectively.
Talgarth, Breconshire, South Wales Sanatorium.—Sen. Asst. M.O. £350.
Torquay, Torbay Hospital.—H.P. £175.
Walsall General Hospital.—Res. Surg. O. At rate of £200.
Watford, Herts, Peace Memorial Hospital.—Res. M.O. At rate of £150.
West London Hospital, Hammersmith.—One H.P.; two H.S.'s; one Aural and Ophthalmic H.S.'s; Res. Asst. Cas. O., Males; also Res. Asst. Surg.
Weston-super-Mare General Hospital.—Res. H.S. £130.

The Chief Inspector of Factories announces a vacant appointment for a Certifying Factory Surgeon at Tunbridge Wells (Kent).

Births, Marriages, and Deaths.

BIRTHS.

BRADFORD.—On August 28th, at Goodrington, South Devon, the wife of Ernest Cordley Bradford, M.A., M.B., B.Chir. Camb., of Laneside, Horsham, Sussex, of a son.

LEAKEY.—On August 21st, at Toro, Uganda, the wife of R. A. B. Leakey, L.R.C.P., L.R.C.S. Edin., L.R.F.P.S. Glasg., of a son.

OLDERSHAW.—On Sept. 3rd, at 18, Weymouth-street, Portland-place, W.1., to Olive, wife of Martin Oldershaw, M.D. Lond., F.R.C.S. Eng.—a son.

SAVEGE.—On August 24th, at a nursing home, Stonehaven N.B., the wife of Major J. M. Savege, R.A.M.C., M.B., Ch.B. Aberd., of a daughter.

MARRIAGES.

BARNES—BERTHON.—On August 28th, at the Subdeanery Church, Chichester, John Francis Lovel Barnes, M.R.C.S. Eng., L.R.C.P. Lond., of Thame, Oxon., to Anna Ethelreda Margaret, only daughter of the late Captain Leonard Berthon, 9th Royal Warwicks Regt., and Mrs. Berthon, of Selsey, Sussex.

MURRAY—THOMAS.—On August 27th, at Holy Trinity Church, Exmouth, John Douglas Ridout Murray, M.B., B.Chir., F.R.C.S., to Evelyn Leslie (Mollie), only daughter of Mr. and Mrs. Lewis Thomas, of Chessington, Exmouth.

TOWNEND—WEST.—On August 24th, at St. Peter's Church, South Croydon, Roy D. M. Townend, M.R.C.S. Eng., L.R.C.P. Lond., to Eleanor L. Clayton, M.R.C.S. Eng., L.R.C.P. Lond., only daughter of Mr. and Mrs. William West, of South Croydon.

DEATHS.

BELL.—On August 16th, quite suddenly, at his residence, Dogflud, Farnham, Surrey, Dr. William Ker Bell (Captain, R.A.M.C.), formerly of Shaldon, South Devon.

CAREY.—On August 19th, suddenly, at Church-square, Basingstoke, Frank Russell Carey, L.D.S. R.C.S. Eng.

HENDERSON.—On August 23rd, at Belleek, Ireland, Edward Erskine Henderson, M.B., B.Ch. Camb., F.R.C.S., of Thackham, Hartley Wintney, Hants.

KISCH.—On August 27th, at Westbourne-terrace, W., Albert Kisch, M.R.C.S. Eng., L.S.A., aged 86.

MACKINNON.—On Tuesday, August 20th, at Davaar, Cirencester, Charles MacKinnon, M.A., M.B., C.M., aged 71.

MORGAN.—On August 26th, Jerome William Morgan, L.R.C.P.I., L.R.C.S.I., L.M., Lieut.-Colonel, A.M.S. (retired), aged 85.

PATTERSON.—On August 31st, in London, Robert Lloyd Patterson, L.R.C.P., L.R.C.S. Edin., L.R.F.P.S. Glasg., of Castle-street, Hereford.

POWELL.—On August 31st, at Brighton, after an operation for appendicitis, Walter Erichsen Powell, M.R.C.S., L.R.C.P., aged 34.

WOOLLATT.—On August 13th, the result of an accident near St. Malo, Percy Charles Woollatt, M.D., F.R.C.S., aged 51

N.B.—A fee of 7s.6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Comments, and Abstracts.

JEAN PAUL MARAT.

THE value of submitting persons famed in history to the illuminating scrutiny of trained psychologists is now accepted. Many facts which previously baffled the historian are thus made clear, and the true factors which underly the policies of princes, statesmen, and nations are brought to light. It does not follow that theories based on evidence surveyed at long range are necessarily correct, but that insight into the reason for abnormal conduct is more likely to be reached by those who have experience in assessing them. We welcome, therefore, a study of the life of Jean Paul Marat, from the standpoint of a psychiatrist physician, Dr. Charles W. Burr, of Philadelphia (Annals of Medical History, 1929). Marat was born in 1743 and murdered by Charlotte Corday in 1793 at the age of 50 years. Little is known about his family history, and our only picture of his childhood is painted in Marat's own reminiscences, which are histrionic and bombastic in the extreme. Marat, according to himself, was an ideal youth with a passion for fame, an exceptional education, and a horror of injustice and oppression. He describes himself as "reflective at fifteen and a thinker at twenty-one." Dr. Burr justly remarks that such sentences suggest the illusions of memory which are so pronounced a feature of paranoid personalities. About the age of 17 Marat left home with the idea of becoming a physician. He studied at Toulouse, Bordeaux, Paris, and London. In 1765 or thereabouts he started to practice medicine in Church-street, London, where he remained for about 12 years. In 1775 he was granted a medical doctorate by the University of St. Andrews. During his residence in London he commenced writing. Among his works were "An Essay on the Human Soul," the "Discoveries of M. Marat on Fire, Electricity and Light," and an "Essay on Gleets"—he claimed to be able to cure any case of gleet. In the "Essay on the Human Soul" Marat concludes that the meninges were the seat of the soul, and the organs of thought, memory, and will. A political book entitled the "Chains of Slavery" was published by him in 1774; in this work "the clandestine and villainous attempts of princes to ruin liberty are pointed out and the dreadful scenes of despotism disclosed." There was some difficulty in getting the book published, and Marat developed ideas of persecution and conspiracy for he decided that the English Government wished to prevent the circulation of the book. He therefore "disappeared" to Holland and turned up almost at once in the North of England, where he paid a round of visits to certain patriotic societies. The style in which this book is written, together with Marat's curious conduct certainly suggest paranoid trends of thought. The work abounds in phrases beloved of the eccentric demagogues who still flourish at the Marble Arch, and who declaim against tyranny, despotism, the sins of the rich, and the guilt of kings. It is probable that Marat's pages did receive some notice from authority, but there is no evidence to substantiate his fears of personal violence or the necessity for flight. Dr. Burr rightly insists that such beliefs and conduct suggest to a psychiatrist delusional ideas on the part of Marat.

Leaving England in 1777 Marat became physician to the Garde du Corps in the household of the Comte d'Artois. There followed a period in which he wrote much on scientific subjects. Dr. Burr tells us that none of these writings possess any particular merit, but Marat himself thought very highly of them. Again we have evidence of ideas of persecution. Marat felt that his work was decried by "envious cowards," and we hear of him proclaiming that the envious philosophers of France successfully prevented the publication of one of his works. From his post as physician to the Artois household Marat came to practice medicine in Paris, urged to do so, he tells us, "by the many sick persons who were despaired of by their physicians and to whom I had restored health." He boasts that his success was prodigious until he excited the envy of the doctors of the Faculty, who, he was convinced, held frequent meetings to consider the best means of slandering him and thus ruining his practice. Again the notion of persecution is followed by a change of occupation, this time to politics and to the editing of a paper, *The Friend of the People*.

There is no need to recite at length the political creed of Marat. The people in his view were those without property or occupation. They alone had the right to govern. His opponents were abused in his writings and speeches in scurrilous and offensive terms. During his last few years Marat led a life of seclusion, constantly fearing attack by his enemies, especially sudden death by assassination or poisoning. These fears were probably not without some justification, but he seems to have become obsessed with feelings of persecution, and lived preaching murder and anarchy as if every man's hand was against him. In 1790 he proposed to the Assembly that "eight hundred gibbets ought to be erected in the Tuileries to hang all traitors," and declared that 270,000 persons would have to suffer death in order to free France from her oppressors. It is of interest that for five or six years before his murder Marat suffered from a skin complaint which caused a painful pruritus. Dr. Burr quotes Dr. Graham Little as holding that the skin lesion was probably a dermatitis herpetiformis. It is known that the itching was relieved by sitting in a bath of hot water, and it was while in his bath that he was murdered.

Dr. Burr sums up the life of Marat as a slowly-growing insanity, in which delusions of suspicion and persecution were prominent from an early age. Towards the close of his years Marat conceived himself as a political genius, with intuitive powers and comprehension. His speeches and writings were prolific, and bear the stamp of egoism and grandiose self-satisfaction. There is much to be said for Dr. Burr's view that Marat was a paranoiac. He was undoubtedly a man of paranoid outlook on life, for he found persecution everywhere, and made the frequent changes of residence and occupation which are often associated with this type of personality. But it is nowhere suggested in Dr. Burr's review that Marat's insanity illustrates the fixed, organised, and systematised delusional state which makes up the paranoia of the text-book descriptions. All will agree to Marat's eccentricity, and to his occasional insane conduct and delusional ideas. There is no need to split hairs over Marat's clinical pigeon hole, but Dr. Burr does not solve the deeper personality problems raised by the life of this paranoid physician and revolutionist.

PAINFUL FIBROSITIC NODULES.

To the Editor of THE LANCET.

SIR,—Is there any satisfactory treatment for the nodules which persist after repeated attacks of fibrositis? My back muscles are studded with them, their cause having been abscessed teeth, long since removed. Most are painless, and beyond being centres of infection are of no account. But one, quite half an inch in length, is so placed in the right trapezius that lying on the right side causes pain which wakens at night, and without sleep a doctor cannot work. I have been at two spas, and the only treatment advised by the specialists, in addition to baths and the waters, has been heavy massage. This is painful and futile.

Can any of your readers report on some of the more modern methods. Is ionisation useful, or high frequency? Has X ray therapy been tried, or radium? I have seen radium dissolve a keloid. Might it not dissolve what is obviously a scar in the fibrous tissue of the muscle? Fibrositic nodules are extremely common. When the cause has been removed surely there must be some satisfactory method of treating them.

I am, Sir, yours faithfully,

August 20th, 1929. M.B., B.Ch.

OPHTHALMOLOGY FOR THE LAYMAN.

THE object of a little book recently published[1] is to teach the layman something about the elementary anatomy and physiology of the eye and its more common diseases, in order that he may coöperate with the physician in matters of treatment. The method chosen is to devote separate chapters to the ailments incidental respectively to childhood, adult life, and advanced age, giving a brief summary of several diseases and their ordinary treatment in each chapter. Much of this matter could have been omitted without loss if greater stress had been laid on those symptoms which point to the necessity of expert advice. Among these are commencing squint in infants, the beginnings of myopia in school-children, headaches at all ages, and failing sight in adults, which may be due to the onset of cataract when delay is harmless, or to a chronic glaucoma when delay is dangerous, or may simply point to the need of glasses. As it stands the book is too much like a very elementary text-book and is not always accurate, for example, in the section on the anatomy and physiology of the retina. It would be better to omit those points which cannot be clearly explained and to concentrate on the subjects likely to prove of practical service. Even in its present form the book will meet the demand of those people who want to know something about the various diseases of the eye with which they are liable to be overtaken or of which they hear in relation to their friends. This demand is quite legitimate though its gratification may occasionally lead to uninstructed criticism rather than to coöperation with the family doctor.

[1] Your Eyes and Their Care. By Edgar S. Thomson, M.D., Surgeon-Director, Manhattan Eye, Ear and Throat Hospital, New York. New York and London: D. Appleton and Co. 1929. Pp. 175. 5s.

THE N.S.P.C.C.

IT comes as a shock to be reminded that 40 years ago no child in the home who had not reached the age of ten years was under the protection of the Crown, and that no one who wronged him could be brought into the presence of the law. It was not until 1889 that the Prevention of Cruelty to and Protection of Children Act was passed, and the Metropolitan and City Police authorities gave instruction that all cases of cruelty to children reported to them should be handed over to the National Society for the Prevention of Cruelty to Children to be dealt with by the Society. Since then much has been done for the emancipation of the child, but the forty-fifth annual report of the N.S.P.C.C. shows that much remains to do. In 1928–29 40,541 cases were reported, under the following headings: neglect and advice sought, 34,362; manslaughter, 1; abandonment, 78; exposure, 455; ill-treatment and assault, 3146; begging, 205; corruption of morals, 316; other wrongs, 1978. These figures show an excess of nearly 1000 cases over the previous year's total, but this is probably due to the wider response of the public to the Society's appeal that cases should be reported to it, and to a wider public knowledge of the Society's object in seeing that every child in the land shall live an endurable life. It is satisfactory to note that under the heading of "corruption of morals" the figures for 1928–29 show a reduction, though a small one, of 14 when compared with the figures for 1927–28. Increased confidence in the Society is shown by the fact that there is a notable increase in the number of instances in which parents have sought advice. In the report of the Medical Officer, Dr. L. D. Saunders, emphasis is laid upon the need for after-care where medical treatment has been found necessary. Four more inspectors have been added to the staff during the year. The Society's Central Offices are at Victory House, Leicester-square, London, W.C. 2.

THE TREATMENT OF ECZEMA.

IT is recognised that there are many factors which may help to produce the clinical manifestations called "eczema." They include, for instance, disturbances of the alimentary and endocrine functions, and metabolic disorders, such as gout, obesity, and hyperglycæmia. But the actual cause of the eruption is still obscure, and treatment remains correspondingly empirical.

Of the internal remedies at present in use C. Bruck [1] will find general agreement in condemning arsenic, except in such cases as are anæmic. A similar if less drastic criticism is applicable to yeast, ichthyol, and sulphur, although the waters of certain sulphur spas are sometimes valuable, possibly because of their relief of constipation and hepatic torpor, or by a tendency to counter acidosis. Following Kreibich's work on the nerve relationships of eczema, modern dermatology aims at reducing the excitability of the nervous paths, including the sympathetic, and often does this with some success by intravenous injection of sodium bromide, or, recently, by giving magnesium bromide intramuscularly. In this connexion Bruck finds the internal administration of antipyrin and pyramidon useful in acute cases, and he has observed that antipyrin ointments have a soothing effect locally, applied in 5–10 per cent. cum eucerin aqua base. Care must be taken not to apply this ointment over too large an area, although so far no ill-effects from absorption have been noted, even in children.

There is no specific dietary for eczema, but proper regulation of the intake in cases of obesity, gout, and hyperglycæmia is, of course, often beneficial. When the patient is undernourished, the cutaneous condition will sometimes improve if cream and butter in excess of the normal intake are added to the diet. Relative acidosis or alkalosis of the blood suggests possible lines of approach in the neurodermatitis type of eczematous manifestation, and in the exudative diathesis which is associated in some cases. Ehrmann claims successes for treatment of neurodermatitis by giving hydrochloric acid by mouth—a method based on his finding that a relatively large proportion of cases show hypochlorhydria. In children with the exudative diathesis and eczema Scheer recommends acidification of the milk, and good results are sometimes obtainable by adding a solution of 20 c.cm. acid. hydrochlor. dil. in 50–150 c.cm. of distilled water to half a litre of milk. The milk must be scalded and cooled before the weak acid solution is added. In cases of relative acidosis, in which the seborrhœic eczemata can be grouped, small doses of atophan followed by a mixture containing sod. bicar. and mag. carb. ust. seem to assist the local applications.

All in all the bulk of modern opinion favours the view that a combination of treatments gives better results than mere application of the well-tried ointments and lotions.

[1] Derm. Woch., 1929, p. 262.

APPETISING PREPARATIONS.

Messrs. Frank Cooper, Ltd., of Victoria Buildings, Oxford send samples of their "Oxford" marmalade, mint jelly, and horseradish cream. The marmalade, which is well known everywhere, was first made on a small scale from a domestic recipe and had its main consumption in Oxford, but for many years it has been manufactured on a commercial scale in response to wide demand. Made without any objectionable preservatives it has the Seville orange flavour. The firm send samples also of a mint jelly to be used as a substitute for mint sauce, and a horseradish cream made of freshly grown horseradish and real cream. These latter relishes to food are usually liked only by those who also have a very distinct idea of how they should be made, so that to hit off a popular taste will be something of a triumph.

THE "HYGIENIC" LECTURE BOARD.

Dr. S. T. Beggs, Medical Officer of Health for the Borough of Middleton, Manchester, has called our attention to the "Hygienic" Lecture Board, which is intended to take the place of the ordinary blackboard. The writing is done on a paper surface which is rolled up and down on, or from side to side of, the lecture board by means of a hand crank. Obviously this method of exhibiting diagrams and notes is more hygienic than that of the usual blackboard and chalk method, while much time is saved by reason of the fact that the diagrams can be permanently preserved and exhibited as required. The paper is written upon by special black or coloured crayons, which do not soil its surface when rolled and unrolled; it is supplied in lengths of 20 yards by 30 inches wide, on a cardboard tube, and the board can be illuminated by an electric bulb and reflector attached to a flexible arm. The apparatus can be fixed to a wall of the lecture room or used on a portable easel. The makers are Messrs. J. Halden and Co., Ltd., 8, Albert-square, Manchester.

AURAL DISEASE AND BATHING.

IN an annotation on this subject [1] a plugging material was referred to made of wool-fibre and plasticine which is sold by chemists as a satisfactory means of preventing the entry of water into the ear. Messrs. Frank Eyles of 8, Western-road, Brighton, Sussex, have sent us samples of ear plugs manufactured for this purpose, which are very carefully prepared by hand, the long fibred medicated cotton wool being thoroughly amalgamated with the plasticine in order to ensure that no disintegration of the plug occurs when it is being extracted from the ear. The plugs serve a useful purpose.

THE PRE-SCHOOL CHILD.

THE thesis set out in a recent addition to the "To-day and to-morrow" series,[2] which already includes more than 80 volumes, is that, under present conditions, the home is not the ideal place, nor are parents the ideal people, for the major part of child-rearing. The smallness of the modern home and the absence of domestic help lead to a situation, especially after the arrival of the first-born, in which man and wife have to seek their pleasures separately, and family life is broken from the start. The effect on the child of limited space and lack of garden is a serious handicap to early activity. Allied to the problem of the cramped house or flat is that "special creation of the present age," the only child, a child upon whom the mother tends to lavish all the love which was meant to be shared by many, with the result that, in Mr. Lewis's telling phrase, "mother love becomes smother love." The solution proposed is an extension of nursery schools on a national scale for all classes. Mr. Lewis considers "that the nursery school is as essential to the mental slums of Golders Green as to the more material slums of Deptford." While lauding America for the enthusiasm with which she has set about providing for her pre-school children, he criticises the tendency to use nursery schools as research laboratories. There is no justification, he says, in creating the abnormal to study the abnormal, neither should the child be sacrificed to make a student's degree day. The book consists of five chapters and an introduction, such matters as play, discipline, and the duties of parenthood being dealt with in an unusually fresh and stimulating way. Mr. Lewis is happy alike in his matter and his manner, and has produced an informative and readable book.

The Deshell Laboratories, Ltd., manufacturers of Petrolagar, have changed the name of their company to Petrolagar Laboratories, Ltd., but have not changed their management or address.

[1] THE LANCET, July 27th, p. 182.

[2] Romulus or the Future of the Child. By Robert T. Lewis, B.A. London: Kegan, Paul, Trench, Trübner and Co., Ltd., 1929. Pp. 95. 2s. 6d.